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AND

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BOUND IN MOROCCO.

According to the cable news, the government of Morocco declined to release the persons under consular protection of the United States whom it has imprisoned, and was not at all frightened by the appearance at Tangier of a United States war-vessel, which, having failed to intimidate the Moors, has sailed away again "to get orders." Either we ought to have more imposing ships, or else they ought to carry their orders with them, so that their commanders shall know what to do in the crisis stated by DOGBERRY'S watchman, "How if he will not?" *

ART IN COINAGE.

A pending bill in Congress confers upon the Director of the Mint the power to "cause new designs or models of authorized emblems or devices" to be prepared, and, with the approval of the Secretary of the Treasury, to be adopted for use in the coinage of the country. We hope the bill will pass; and we hope also that, before the final adoption of the designs prepared under it, they will be submitted to the criticism of the public. They would be criticised anyhow; and there is no harm in having the comments made at a time when if any thing sensible is said, it will be of some use. If the Bland head of Liberty on the silver dollar had been thus exhibited beforehand, some smart fellow would have found out its resemblance, when turned upside down, to George the Third in a cocked hat, and patriots would have been spared the pang of this perpetual reminder of the inverse ratio between "American silver" and "British gold."

Moreover, we do not wholly trust the taste of unknown single artists in this matter. A good deal of nonsense is talked about "artistic" designs upon coins. Director KIMBALL, in his last report, says that such designs, ancient or modern, are accepted "as an expression of the art of their time." If he means any other art than that of coinage, we can not agree with him. Most of the coinage-designs of other countries have represented either portraits of sovereigns or heraldic emblems. It is the misfortune of our coinage that it has been tinkered too much in the interest of "art." Liberty was not pretty enough; or the Bird of Freedom did not look like a bird; and successive Mint designers have tried their 'prentice hands on ideals of female beauty or ornithology. The present positive awkwardness and ugliness are the result.

As DR. KIMBALL well remarks, "whatever art-value be attributed to any of the series [of United States coins] seems to be in impressions from certain long-superseded dies."

Conceding, as we do, that the present designs may well be amended, we should be glad to believe that this amendment would be final, and not sorry if it consisted merely in a return to some of the earlier forms which the Director justly praises. For the *desideratum* in coinage is not progress, but uniformity. Give us pefect mechanical execution and devices that do not change with every administration of the mint.

Fancy the artists of Germany protesting that the Imperial Eagle is not anatomically correct, and demanding that it be reconstructed! If our designs were old enough to be venerable, we should object to any change; and what we desire now is that something shall be selected which can be allowed to grow old.

We venture only one further suggestion, called forth by the criticism of the *Studio* upon the head of Liberty on our present dollar. Our contemporary describes the self-evident wig, the fussy head-dress, and the absurd bonnet crowning the whole, as constituting a type which it hopes "no American would accept as representing his country women." We trust that no improvement will be attempted which aims at a *really* typical representation of our country women, in the matter of hair and bonnets—that's all! We make the observation in the interest of the managers of our places of amusement. If a man were to see, when about to pay for his entrance-ticket, an effigy of the structure behind which he would probably have to sit, he would put up his money and go home.

The only compensation of such a typical design would be, that it would necessitate the increase of the amount of silver in the dollar, to make room for the bonnet. *

THE STATE LAND SURVEY.

The report of Mr. VERPLANCK COLVIN, Superintendent of the State Land Survey, sent to the Legislature February 25th, is a brief statement of the small amount of work done during the year, under the almost fatal disadvantage of deficiency in means. The Governor vetoed, last year, the appropriation made for this work, on the ground that the law requiring it should be so changed as to abolish the separate organization of the Survey, and put it, with everything else of the kind, under the State Engineer. That the executive head of the State should desire and recommend a legislative measure of this kind is proper enough, whether he be right or wrong in his view. But that he should carry his zeal for legislation so far as to veto the appropriation of a moderate sum required for the execution of the law as it is, looks a great deal more like personal hostility than statesmanship. It has not been claimed that the work ought not to be done, or that Mr. COLVIN'S corps was not doing it well; still less that a public injury was going on, which called for a summary remedy in the nature of an injunction.

On the other hand, the Legislature has not chosen to adopt the Governor's suggestion as to the law; and the result is the one thing that is certainly bad, whatever may be good, better or best. As in the case of quarantine matters, the census, and other important issues, the party quarrels of the politicians operate to the delay or defeat of necessary improvements. We are not specially interested to defend Mr. COLVIN, or the system under which he has come to have charge of the imperatively necessary work of the State Land Survey. But his department has had control of the work since 1872, when it began; and in the absence of definite charges against it, common sense suggests that it should go on and finish the survey. To raise the question of a change, and then to decree that the work shall stand still while that change is debated, strikes us as an unwarrantable use of the executive power.

Mr. COLVIN states in few words the importance and the difficulty of that part of the survey which deals with interior boundary-lines—*i. e.*, the lines of patents, townships and properties,—within the ten counties of Northern New York which are assigned to his department. The State

lands, to which the survey is specially directed, consist of several thousand separate tracts, scattered through these counties; and of course it is necessary to determine all adjacent lines of political division or private ownership. The fact which he reports is a significant proof of the accuracy and discretion of his engineers, namely, that every line which has thus far been retraced and restored by the survey has been finally accepted by the parties affected as the authoritative boundary.

Not only the prosecution of field and office-work, but also the publication of the last annual report, has been defeated by "obstacles which proved to be insurmountable"—under which vague general term we suppose Mr. COLVIN means the Governor again. There is one thing which we advise Mr. COLVIN to do to such a Governor, namely, survive him!

*

THE BURLINGTON STRIKE.

It has been impracticable for a weekly journal to discuss the successive phases of the engineers' strike on the Chicago, Burlington & Quincy Railroad, because they have succeeded one another so rapidly that even daily comments could scarcely keep up with them, and prophecy, in the popular sense, was out of the question. But there is a prophecy, of the old-fashioned, Scriptural kind, which consists in detecting and declaring the principles involved in social conditions and changes; and this is not affected by the turn that a day or a week may give to the immediate event. We claim no inspired monopoly of this function, and no originality in our performance of it. It is simply our belief that when law is defied and liberty assailed, every citizen should do his part to create and express an overwhelming public opinion, against which the offenders can not stand. We do not think any other question should be allowed to distract attention while this one remains unsettled. It is quite as vital as was the issue of the Union, for which the nation went to arms And it is to render an appeal to force in this case unnecessary, that we wish to see public sentiment collected and made omnipotent through peaceful channels.

Whatever might have been the reasonableness of the demands made by the Brotherhood of Locomotive Engineers upon the Burlington railroad officials, the strike and its concomitants would have been unjustifiable; and the duty of society towards it would have been imperative. The situation finds its parallel in an Indian war. We are obliged to confess with shame that most of our Indian wars have originated in wrongs perpetrated by the whites upon the savages. Nevertheless, when these victims of civilized injustice break out, and, taking the law into their own hands, begin to burn and scalp indiscriminately, there is but one view as to what should be done. An eloquent "paradoxer" (to borrow DE MORGAN'S word) like WENDELL PHILLIPS may, at a safe distance, utter his word of applause for the marauders; but all men of sense know that the first duty is to hunt or kill and capture them. Investigation or redress may come afterwards, but can not be permitted to intrude, and hinder the swift measures of self-defence.

In like manner, the operations of the Brotherhood and its allies have been a war upon the whole community; and the community was bound to put them down. We do not stop to expose the subterfuges by which these men have sought to evade the responsibility of their conspiracies. Nobody has been deceived by them. When thousands of employés leave work simultaneously, because they are individually "tired;" when, with equal unanimity, they get over being "tired," on receiving sufficient encouragement or discouragement, as the case may be, or on learning that some other tactics will be more effective; when Mr. ARTHUR "don't know" why this or that was done, or goes ostentatiously back to Cleveland, disclaiming connection with the vast outside disorders which his course has instigated; when all these changes of attitude are contrasted with the arrogant proclamations of the beginning, and are seen to have taken place successively, as the penalties of the law were, one after another, explained by the courts, and their application became imminent—who does not understand that the old issue remains unchanged? If a few men in secret conclave may paralyze the commerce of the country in an hour, they might as well do it openly as under this thin disguise. And if, on the other hand, the attempt is a crime, such masquerading will not long protect the criminals.

It is conceivable that Mr. ARTHUR, like Mr. POWDERLY, has raised a storm which he can not control; but we are not profoundly convinced that the impotence of either of them is real. We have heard a good deal about these powerful officials who can start any amount of mischief, and then profess themselves powerless to stop it. On their own showing they would be simply incendiaries, who had spent months in arranging combustible material, and then, after they had put the match to it, were surprised to see such a big fire, when they had intended to make only a little one. But in such cases the jury is apt to infer the extent of the purpose from the amount of the preparation, and not to be deceived, even if the man who poured on the kerosene at first, pours on a little water afterwards.

We have said that this whole performance would have been unjustifiable, whatever had been the justice of the complaints or claims of the Burlington engineers. But it is proper to put on record the fact that the strike was begun in support of demands which were unreasonable in themselves, belonged to a class calling for no such summary action, and were urged with utterly unwarrantable precipitation to the disastrous issue. We say this after reading the demands of the engineers and the reply of the railroad officials, both of which have been published, together with the previously existing rules, against which the complaint was made, and without any further note or comment, by the Burlington Company. The showing of this record is so severe upon Mr. ARTHUR that he has felt obliged to explain it; and his explanation, if correctly reported, is, that the Brotherhood asked for more than it would have been willing to accept! In other words, its *ultimatum* was only a basis for compromise. All this goes to prove that the real reason of this outbreak, like the reason of the anthracite strikes, was not to reform any intolerable wrong, but to establish more firmly the supremacy of the organization involved in it. One of the first reported utterances of Mr. ARTHUR, after the strike began, was the significant declaration that the very existence of the Brotherhood depended upon winning this battle. No one can read the documents to which we have referred, without feeling the absurdity of making the "existence" of either party to the controversy depend upon the adjustment of such matters. It is like the famous war-cry of "54° 40′ or fight!"—only in that case the party that did the shouting wisely accepted 49° and no fight; and the "existence" of two nations, not to say of a good many private citizens, was peacefully continued in consequence.

Yet Mr. ARTHUR'S statement was not absurd. The leaders of "labor organizations" must maintain the *prestige* of invariable victory, or they are lost. The Napoleons of "labor," like the Napoleons of finance and of politics, are driven by fate until they find their Waterloo—and they find it, when they undertake to conquer continents. If the interior history of this campaign ever comes to be fully known, we shall not be surprised to learn that the relations between the Knights of Labor and the Brotherhood, which evidently have had much influence upon its progress, had much also to do with its beginning. It was incumbent on Mr. ARTHUR to show how much better he could manage such matters than Mr. POWDERLY, or any of those ardent Knights who fiercely attack, while Mr. POWDERLY disclaims responsibility. For all we can see to the contrary, his luck is like his rival's. His subordinates and allies attack and he disclaims. But the indications are that he is defeated at every point on the line of battle which he professes to survey without commanding, including the part of which he confesses the command, and with which he began the action. The "existence" of the Brotherhood as an irresponsible power, governing the United States, is clearly not to be. If it continues to "exist" at all, it must be content with the rights and laws established by a much larger brotherhood, of which it forms but a small part.

According to the latest news received at the time of writing this article, the "sympathetic strikes," "boycotts" and "tie-ups" are all to cease; and the Burlington road is to be punished by being "overwhelmed with more business than it can do." We fancy the Company would take kindly to that sort of punishment; but we fear the sentence will not be executed. It is too good to be true.

*

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
All letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

Mastodon and Silver Reef Mining Companies, Arizona.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: My letter in your issue of the 3d inst. might mislead some to think that I classed all three companies therein mentioned as stock schemes. Such was not my intention. The title should have read, "Something More that Hurts Mining in Arizona." It will be noted that the Mastodon and Silver Reef companies are mentioned as having each a few men prospecting their mines. Such is the fact. I also state, in effect, I hope we are to have no more stock schemes in this section; and this is the sum and substance of my writing. I have no means of ascertaining the status of the two companies above, and in the absence of any proof to the contrary, it may be presumed that their intentions are honorable. Nevertheless, if my letters to you has placed on their guard people who invest in mining companies, and notified those who manipulate stock schemes, that their operations in this section will be closely scrutinized, they will have served a purpose, and investors east as well as mine owners in this vicinity will receive the benefit. I would be sorry to prejudice investors against any company whose operations are conducted fairly, and do not wish to cast a shadow upon any such. Since receiving my copy of the JOURNAL of the 3d inst., I am the recipient of many not very complimentary remarks, among which blackmailer, etc., is the commonest, and the indignation of certain classes is not confined to merely remarks, but threats freely indulged in. All this to a limited extent must be allowed for. Those whose ox has been gored, of course, do not view in an amiable mood the frustration of their hopes.

All this admonishes me that a mining engineer will scarcely when exposing frauds receive backing in a mining community, at least one in the vicinity of such fraud. The great desire is, to get mining companies interested here, "to take hold of something," no matter what, just so they spend money of their own or other people's. "Keeps the money in circulation, you know." The idea of encouraging honest engineers and companies in the prosecution of legitimate mining for the profits that solely may accrue from a careful, economical, and honest system, is not given a second thought by press or people, and the fact of a prospector having gone last year to one of the northern territories and sold $7500 worth of "wild-cats," is an event for commendation by quite a number. I am accused of giving the country the black eye. It is scarcely necessary to say I have no such thought; in fact, just the reverse is my intention. This district, Casa Grande, resembles Tombstone in many respects, so much so, that it is a surprise to me that investors have not discovered it. The formation limestone is threaded by beds and dykes of porphyry; the veins are in the contacts and a number unusually large, they dropping through two or three claims in length, while many carry, like the Tombstone ores, gold from a trace upward in addition to silver contents. The deepest workings, 160 feet, show they are mineralized at this depth, a car load of rich ore netting over $6000 having been extracted from the "Jack Rabbit" mine at that level. I merely state this to show that permanency in the mineral is a fair conclusion. Beds of this class, in addition to the large bodies of a lower grade milling ore, contain pockets and streaks of this very rich grade. All these mines lie within twenty-four miles of the railroad, with a natural level road to freight over. Wood is present in sufficient quantities for a few years, after which coal or crude petroleum will be cheaper. Five miles further south is a gold district, the veins in a talcose schist: deepest shaft, 40 feet; width of vein at this depth, 3 feet; average of vein matter, $37.60; character of vein material, a ferruginous quartz. This is merely one of a number of excellent gold properties. Now, when a mining company is organized, why not bond a mine that has pay mineral to start on. It costs no more to bond a prospect of this class than one on which they "hope to strike it." This has been a source of wonder to me, why companies do not look up prospects that promise well from the start.

Very truly yours, HARRINGTON BLAUVELT.

CASA GRANDE, March 16.

Henderson Steel.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The first trial here was with Birmingham white pig with ore and fluorspar on a raw dolomite hearth composed of fluorspars and dolomite which lasted until near the close of the operation, when it melted and passed through the metal. The dolomite analyzes carbonate of lime, 59·8 per cent; carbonate of magnesia, 39·2; silica, ·34; protoxide of iron, ·1400, and is quarried on the premises.

The steel produced is superior tool steel, which practical experts at the railroad and other machine shops here say is equal to Mushet's, that sells by the ton at 48 cents a pound. It is still in use after withstanding three times the wear of tool steel that they pay 16 cents per pound for. The analysis is:

Carbon	0·75	Phosphorus	0·051
Silicon	0·009	Manganese	trace

The pig-iron cost $10 per ton, and the ore 65 cents per ton on cars at mine.

The superior quality here indicated is no doubt to be attributed to the use of fluorspar, which, although no fluorine can be detected by chemical analysis in the metal, gives the property of toughness to a surprising degree, as, for example, some stay-bolt iron made by me in 1876 and furnished to the Pennsylvania Railroad shops at Altoona. Dr. Dudley, who tested it, reported 45 per cent elongation, or over 3 times that usual in good ordinary puddled iron.

Another trial was made on a calcined dolomite and fluorspar hearth with pig and scrap steel and ore with less fluorspar for soft steel. Five per cent of spiegeleisen was used, as there was no ferromanganese at hand. The steel analyzed: Carbon, 0·20; manganese, 0·75; phosphorus, 0·0 5.

It is first-class metal for boiler plate, although the pig contains 0·3286 per cent of sulphur.

The analyses of the slags of the second trial show results which will be deemed incredible by many, although since the publication of my treatise on metallurgy, iron, steel and fuel will not be new to them. The analysis is by Mr. Alfred F. Brainerd, of this city. There were about 200 pounds of the slag to a ton of steel:

Metal iron as peroxide	8·190	Sulphur	0·095
Silica	29·250	Phosphorus	1·1035

The pig-iron and ore contained about 13·5 pounds of phosphorus, and there was ·7 pound left in the steel; the difference, about 10¾ pounds, was volatilized. The iron ore used was 250 pounds of 45 per cent metallic iron, so that 85 per cent of it was incorporated with the charge.

It is intended to attach condensers to the furnace and condense in it the volatile phosphorus in the gases after they have been cooled under a boiler, by forcing them into water just above the freezing point, and thus produce hydrous phosphoric acid of any required strength, and sprinkle it over the land to fertilize it. By this process the slag will not contain enough phosphorus to be of use.

The results are obtained in a great degree by the homogeneous flame produced by burning the gases before they enter the steel converting chamber, which of themselves cause the volatilization of the phosphorus, as every 100 pounds of coal burnt yields 45 pounds of vapor water to them, which dissociates in burning to oxygen and hydrogen. The water for condensing the gases will be cooled by an ammonia ice apparatus.

Calcined dolomite mixed with 10 per cent of fluor makes a durabl lining, and that on the bottom where it is not acted on by silicates in the slag which obtain in the pig and ore process, it is not perceptibly worn after 5½ hours use—the time taken by a pig and ore heat—but the slag line at the side requires renewal after each heat, owing to the silica and oxide of iron fluxing a portion away; but with melts or casts containing about one fourth steel or iron scrap and three fourths pig, no ore is used, but dolomite and fluorspar in equal quantities. These enable a melt to be taken every three hours, and there is scarcely any perceptible wear to the sides of the hearth lining. The furnace before starting to make steel met with an accident. The heating up was being done by the gas from the producer without being mixed with air; the air found its way through crevices in the brick work and caused an explosion which dislocated the brick work and prevented the use until rebuilt of the second or refining chamber, in which pig-iron is melted and refined of its silicon and half of its carbon and then poured into the first chamber, which operation takes about three hours. The second, or refining chamber, is lined with sand and the metal is purified of silicon and carbon by the aid of phosphoric iron ore. The metal gains one-fourth of the phosphorus from this ore and about three-fourths of the phosphorus in the ore is vaporized and will be collected in the ammonia condensers before referred to. The metal, when introduced into the first or finishing chamber, will be in the condition of high carbon steel, plus the phosphorus, and will be reduced to soft steel, free of phosphorus, in about two hours after charging. The wear on the slag line will be no greater than on the bottom, owing to the absence of silica and oxide of iron from the bath.

In making the side or repairing the slag line the pulverized dolomite and fluorspar have a little soda added to facilite setting, and are mixed into a mortar made with water and 15 per cent of molasses, which keep them in place after charging. The dolomite should be frit ed or overburnt, for which I have several patents of preparing, including use of fluorspar, of fluorspar, molasses and water made into a mortar.

There are large tracts of phosphoric ore in Alabama, ranging from 0·18 per cent to 37 per cent of phosphoric acid, which may be mixed together in proportions to yield pig-iron containing 3½ per cent of phosphorus, which may be recovered as hydrous phosphoric acid, as a by-product, as such is worth $14 50 net per ton of steel for fertilizing purposes. The pig-iron being white will cost under $8 per ton. The steel ingot then under these conditions is made free of cost, exclusive of license fees to the owners of my patents. JAMES HENDERSON.

BIRMINGHAM, Ala., March, 1888.

NEW PUBLICATIONS.

UNITED STATES GEOLOGICAL SURVEY MONOGRAPHS. XII. *Geology and Mining Industry of Leadville, Colorado. With Atlas.* By SAMUEL FRANKLIN EMMONS. Washington. 1886.

The work on which this report is based was mostly done before May, 1881. The letter of transmittal is dated October 1st, 1885; the date of the imprint on the title page is 1886; and it has but very recently been distributed. During the more than six years of its tarrying in composition and in press, a good many things have been revealed and explained at Leadville. Of some of these, account is taken in foot-notes. The text of the report, as Mr. Emmons points out in his preface, is essentially that which was prepared in 1881. So far, therefore, as descriptions of mine workings and mining and metallurgical industry are concerned, it is largely out of date, though it contains much that will be historically valuable.

The published reports of scientific surveys and studies of a mining district, conducted in this elaborate and thorough manner, have seldom greatly assisted in the development of the district itself. It has sometimes been the case (as we know it to have been with Mr. Emmons's work at Leadville) that the geologists and engineers engaged in such a work have furnished, during the work itself, valuable suggestions to mine owners. But by the time the books and maps make their appearance, the ore-bodies they describe have usually been exhausted. In fact the scientific data are mostly furnished by the underground workings; and the results are comparable to those of destructive analysis in chemistry.

The reports on the geology and vein phenomena of the Comstock form an illustration. Apparently the last man to leave that famous lode will be a scientist, who will lay down, after all mining shall have ceased, the final, correct theory of "the formation."

But this is no argument against such careful work. On the contrary, it is by such study, directed rather to truth than to news or prophecy, that knowledge may be gained which will assist both science and industrial enterprise in future instances. The exhaustive investigation of one district like Leadville is worth a hundred hasty and superficial theories, as a guide to the student of the science of ore-deposits.

Hence we consider the chapters of Mr Emmons's monograph in which he discusses the source, age and deposition of the ores, to be the most permanently valuable portion. The rest is perhaps chiefly important as furnishing with clearness and amplitude the grounds of his conclusions.

We should add, that the general geognosy of the region is admirably described, and the system of faults (since shown to be even more complicated that Mr. Emmons made it) is explained with a lucidity reflecting much credit on the patience which worked out this problem of structure.

THEORIES OF LEADVILLE ORE FORMATION.

After reviewing the principal classifications of ore-deposits, and declaring that no one of the subdivisions proposed would exactly define the Leadville bodies, Mr. Emmons states the following propositions concerning the latter:

1. That the main mass of argentiferous lead-ores is found in calcareo-magnesian beds

2. That ores containing gold and copper are more frequently found in siliceous beds, in porphyries or in crystalline rocks.

3. That the Leadville ores were deposited from aqueous solutions.

4. That they were originally deposited mainly in the form of sulphides.

5 That the process of deposition was a metasomatic interchange with the material of the rock in which they were deposited: that is, that the material of which they were composed was not a deposit in a pre-existing cavity in the rock, but that the solutions which carried them gradually dissolved out the original rock-material and left the ore or vein-material in its place.

6. That the mineral solutions or ore-currents concentrated along natural water-channels, and followed by preference the bedding-planes

at certain geological horizons, but that they also penetrated the adjoining rocks through cross-joints and cleavage-planes.

7. That they were deposited not later than the Cretaceous period.

8. That the metallic contents of the deposits came from above.

9. That they were derived mainly from the neighboring eruptive rocks.

We have numbered these propositions for convenience of reference. Nos. 1 and 2 are observations already made in other mining districts. The larger interest attaches, in the Leadville district, to the class of deposits named in No. 1. Mr. Emmons carefully avoids the ascription of any particular geological age to ore-bearing limestones in general. Such attempts to connect ore-deposits (except stratified beds like the Clinton hematites) with special horizons have always come to grief. The fate of Sir Roderick Murchison's famous generalization about the age of gold-bearing rocks should be a warning to theorists. Mr. Emmons attaches therefore no special significance to the fact that the ore-bearing blue limestone of Leadville is Lower Carboniferous, and mentions that the deposits of Ten Mile district, only six miles from Leadville, are in upper carboniferous rocks. Ten Mile presents another significant difference. Its ore-bearing limestones are non-dolomitic, which leads our author to think that the frequently magnesian character of the silver- and lead-bearing rocks is merely a coincidence, without causal relation.

The Leadville blue limestone contains some organic matter, which would promote the reduction of sulphates in solution to sulphides. But Mr. Emmons thinks that not chemical, but physical and structural, conditions, and especially the relations of the rock to the intrusive porphyries, have chiefly determined it as the seat of extensive concentrations of ore.

Nos. 3 and 4 are propositions which no intelligent student of the Leadville and similar deposits denies. It is with No. 5 that controversy begins. Mr. Emmons's view is distinctly opposed to that of Professor Newberry, who has described the Leadville bodies as deposits in pre-existing openings and caverns. The argument may be summarized thus: The bodies shade off gradually into the country-rock, except where porphyry forms a boundary; they contain numerous fragments of unaltered limestone, which do not lie at the bottom, but are completely inclosed by the ore-bearing material; in some places (as on Fryer Hill) they have completely replaced the limestone strata (except as to remnants, mostly dolomite sand), and are bounded by porphyry; they carry as constant constituents, lime and magnesia, decreasing from the outside towards the middle of their mass; and when these substances are visible, they are seen to be granular rather than cystalline. On the other hand, Mr. Emmons declares that the familiar signs of cavity-fillings are absent from them; that they have not the shape or boundaries, the fragments on the bottom or the arrangement of the filling-material, which such a hypothesis requires. Professor Newberry's deduction from his theory, to wit, that these deposits will probably prove of limited extent in depth, since the excavation of limestones "must be confined to the zone traversed by surface drainage," is cleverly turned against him by adducing evidence that the deposits in question were formed at the depth of about 10,000 feet below the surface, which is deeper than any surface drainage is likely to extend, at least, without loss of its free carbonic and organic acids, and hence of its limestone-dissolving power. Finally, Mr. Emmons points out that caves are actually found in the Leadville limestones; that they are more recent than the ore-deposition or even the sulphide-oxidation; and that they cut through limestone and ore-bodies indiscriminately.

We think he has made out his case to this extent: that he has shown metasomatic replacement to have been unquestionably the chief agency in these formations. This does not exclude (and, indeed, proposition No. 6 involves) the influence of such pre-existing cavities, fissures, etc., now obliterated by the enlarging and filling processes, as may have determined the channels of infiltration. Nor does it prevent us from ascribing a true cave-origin to such ore-bodies, even in this district, as clearly show cave-filling by their form and contents. We will not assert positively that such exist, never having verified by personal observation the assertions of that kind which we have heard.

Mr. Emmons gives but a brief and unsatisfactory treatment to the chemical part of his theory:

If the metals were deposited in these bodies originally as sulphides, in what sort of solution were they introduced? The metallic sulphides are soluble in water containing alkaline sulphides or sulphuretted hydrogen, and silica and the earthy bases are soluble in water containing alkaline carbonates. Solfataric waters answer both requirements. But it is difficult to conceive how solutions thus capable of carrying metallic sulphides and silica could also be capable of dissolving limestone. Hence Mr. Emmons concludes that if sulphide solutions brought in the original ore, there must have been a foregoing dissolution and removal of the lime-carbonate, the place of which they took. This, he admits, "apparently involves the pre-existing cavity theory;" but he suggests that the dissolving process may have preceded the deposition so immediately as to make of the two practically an interchange. This it is hard to accept as probable; since, if we comprehend it, it involves a continual alternation of solutions of different character. We are not surprised, therefore, that he inclines to the theory of sulphate solutions as the vehicles of the metallic ores. "In contact with dolomite containing organic matter, the sulphates would be reduced to sulphides with the formation of carbonic acid. The waters thus charged with an excess of carbonic acid would dissolve and remove the carbonates of lime and magnesia, which would be replaced by the metallic sulphides. Any excess of sulphuric acid would form soluble salts of lime and magnesia, which would also be carried away."

Mr. Emmons says the most important objection to the hypothesis that the metals were brought in as sulphates is that the relative insolubility of lead sulphate as compared with that of iron or zinc seems inconsistent with the relative amount of lead in the deposits. There are two other difficulties, one of which he hints, though not in this immediate connection, namely, that at the Robinson mine, in Ten Mile district, the ore-bearing limestone apparently does not, while the barren limestone apparently does contain organic matter. But the ore-formation seems to have been similar to that of the Leadville district. The other difficulty which Mr. Emmons appears to have overlooked, is that of conceiving oxidizing waters, and hence, sulphate solutions, at the depth of 10,000 feet below the surface. The very argument which Mr. Emmons has so triumphantly advanced to show the great improbability of limestone caverns at that depth seems to us to render equally improbable the circulation of sulphates formed by the oxidation of sulphides. If we should fall back on Professor Wurtz's "sulphate ocean," we might perhaps get over this difficulty, but only to encounter a worse; for the sulphate ocean can hardly have existed since the Palæozoic periods began. We do not remember that Professor Wurtz claimed any fish in his vitriol sea. Hence we must assume that Mr. Emmons's hypothetical sulphate solutions were formed by the oxidation of sulphides; and how could sulphides be oxidized at such depths?

Leaving these chemical difficulties, we come to propositions Nos. 6 and 7, which may pass without question here, and reach Nos. 8 and 9, which are the most doubtful of the series. To these we shall devote another article. *

OFFICIAL REPORTS.

Atlantic Copper Mining Company, Mich.

The directors present the following report of operations during the year 1887: The production of mineral was 5,074,361 pounds, which yielded $71\frac{7}{10}$ per cent, or 3,641,865 pounds of refined copper. The shipments to market amounted to 4,021,726 pounds (including 379,861 pounds of the product of 1886), which realized an average price of $12\frac{13}{100}$ cents per pound. The following is a summary of last year's business:

PRODUCTION.			
3,641,865 pounds copper, at about 12 34-100c			$449,504 38
Add balance of interest account			2,774.57
			$452,278.95
COSTS.			
Working expenses at mine, as per clerk's tables		$392,660.59	
Freight	$13,483.48		
Smelting	35 284.12		
Expenses	6,354.91		
Brokerage	2,013 48		
Insurance	1,486 49		
Storage	384.95		
	59,007.43		
		361,668.02	
Showing a mining profit in 1887 of			$90,610.93
Expended for additions to plant	$7,232.89		
Thomas J. Pope & Bro	2 512.00		
		9.744.89	
Leaving a net gain for the year of			$80,866.04
The surplus from 1886, after payment of dividend, was			264,100.09
Net surplus, December 31st, 1887			$344,966.13

and out of which a dividend of $1.50 per share ($60,000) was paid February 1st, 1888.

In order to take advantage of the improved copper market, the copper produced after the close of navigation was brought to market by rail and disposed of at satisfactory prices.

SPIRALLY WELDED TUBING.*

By J. C. Bayles, New York City.

It is seldom the privilege of one who contributes to the Transactions of a technical society, to describe a new industry in which, by processes employed for the first time, are attained results of conspicuous value. There are but few such patches of virgin soil worth the tilling, within the area circumscribed by the industries which have experienced a regular and uniform development. New and startling methods of production are often announced as about to be introduced; but, as a rule, they take their place among the "large desires with most uncertain issues," or give new significance to the historic words of an eminent statesman concerning "the bright beginnings and the bitter end of a halcyon and vociferous proceeding." In this paper I shall have the pleasure of briefly describing a new industry which has been established without announcement or proclamation—the manufacture of serviceable pressure pipes of great strength, from strips of steel or iron wound spirally, heated only along the overlapping edges, welded by hammering and finished into tubes of uniform diameter, and of such length as may be found convenient in handling and transportation. As such tubes are now manufactured on a considerable scale, in a range of sizes which will soon include every thing between 4 inches and 30 inches, and as much larger as may be needed, both process and product are likely to be of interest to engineers in all departments of professional work.

The raw material of the industry is the ordinary sheet-iron or steel of commerce, of such lengths or widths as it is convenient to roll. The range of the gauges of the metal which can be employed has not yet been determined. The lightest metal thus far successfully made into pipe is No. 29 iron, and the heaviest a steel gauging somewhere between 12 and 14. Heavier machines are now building which will bend steel .165 of an inch in thickness, or No. 8 of the Birmingham gauge. Probably No. 20 or No. 22 will be the lightest used in making commercial pipes, but the experiment with No. 29 was interesting as showing the readiness with which the flame can be controlled. To get a welding heat with such thin metal and not burn or fuse it, is a delicate operation. The gauge of stock which may be used when great strength is desired depends upon the diameter of the pipe, the stiffness of the material, and the rate of speed desired in running the machine. Heavier metal can be used in an 8- or 10-inch pipe than in one of 4 inches, as the greater radius or curvature involves less difficulty in bending and forming it, and its tendency to spring back after receiving the desired shape is less pronounced. However, the range of practicable gauges is great enough to meet all the requirements of strength under light or heavy pressures.

The first step in the process of manufacture is to slit the sheets into bands of the width most convenient for the production of the desired diameter of pipe. This is done with an ordinary rotary shear provided with a table and guide. The relation of width of skelp to diameter of pipe is not arbitrary. In a 6-inch pipe, for example, 6-inch, 8-inch, 10-inch, or 12 inch skelp may be used. The wider the skelp the faster the

* A paper read before the American Institute of Mining Engineers, at the Boston meeting, February, 1888.

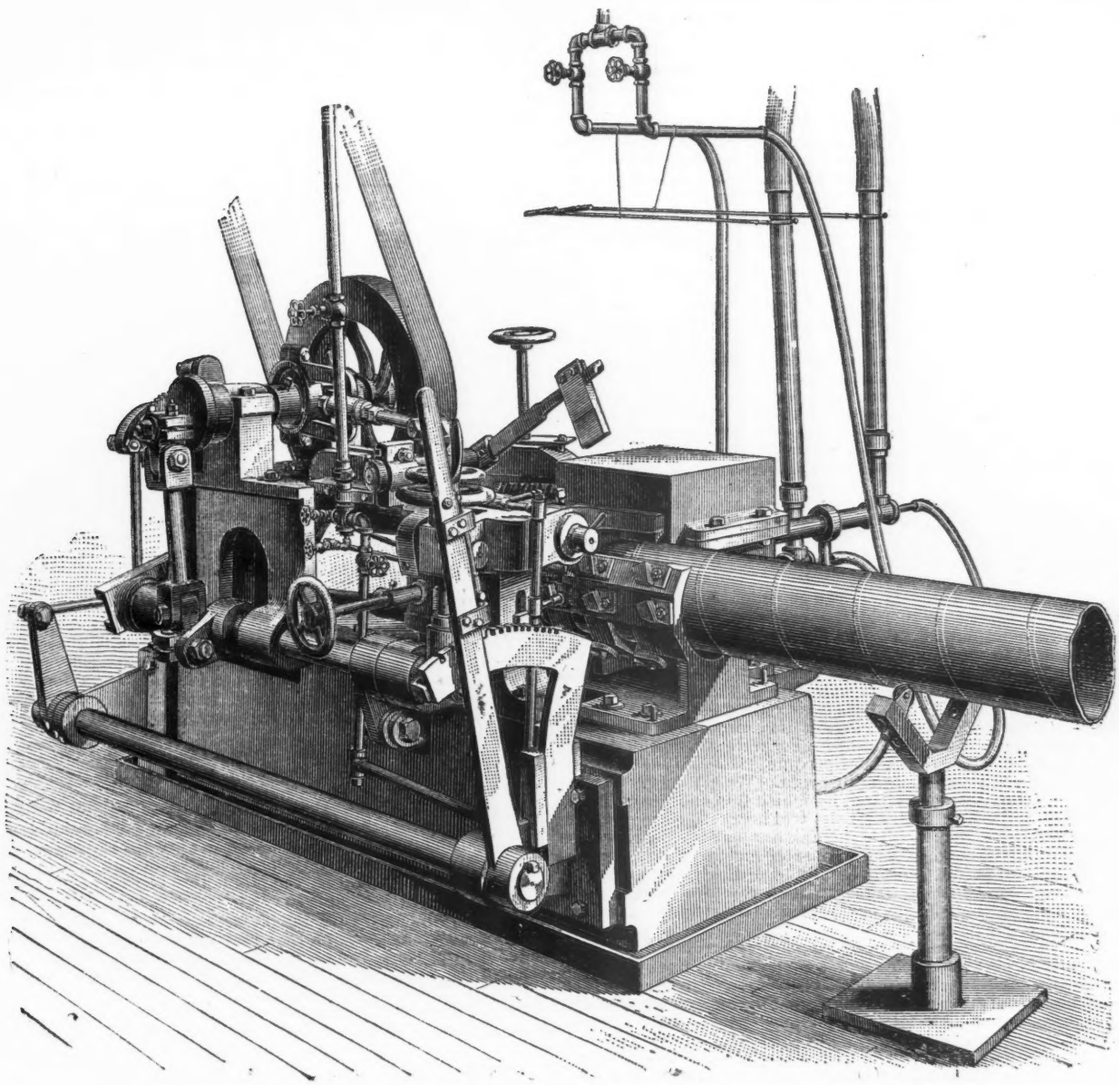
pipe is made. With 8-inch skelp 8·175 inches is added to the length of a pipe of 6 inches diameter at each revolution; with 12-inch skelp it gains 14·59 inches with each revolution. For convenience, all diameters are made from four widths of skelp, 6, 12, 18, and 24 inches.

As it is difficult to obtain sheets longer than 12 feet, it is necessary to unite the ends by lap-welding, if long pipes are desired. To make a 6-inch pipe 30 feet long from 12-inch skelp, it is necessary to have a ribbon of metal about 49 feet long. The ends of the strip of skelp are united by a machine known as a cross-welder. The sheets are so placed as to give about ½ inch lap, and in this position they are firmly clamped. Heat is then applied by furnaces above and below, which move along the seam. As they recede, the hot edges are welded between a hammer, moving vertically, and an anvil of reciprocal motion. To place and clamp the skelp, heat the overlapping edges, and weld them, consumes about one minute to each cross-seam of 12 inches. A pressure of the foot foot of the operator upon a treadle, engages a worm-wheel and worm, which rotates a reel upon which the skelp is wound. As it is drawn from the reel, it passes between pressure rolls, which smooth out any buckling or other irregularity in the still hot metal, and rotary shears trim off the burr at the ends of the welded seam. In case the weld is defective or the sheets have not been clamped in line, the weld is cut by a shear, held suspended when not in use, and the ends are welded again. As the rule, the weld is smooth and perfect, and the extra thickness of metal at the weld occasions no inconvenience in forming the pipe.

The pipe-machine, shown in the accompanying illustration, is quite simple in construction, and is chiefly made of heavy castings, requiring but little finish. It occupies about 3 × 6 feet of floor space.

The reel carrying the ribbon of skelp is put in position, and one end of the metal is placed upon the guide-table, which is set at the angle due to the width of the skelp and the diameter of the pipe into which it is to be made. The metal is carried into the machine between feed-rolls geared together, which are actuated by a ratchet, giving them an intermittent rotation, and a rate of feed variable between $\frac{1}{16}$ and $\frac{3}{8}$ of an inch at each impulse, at the pleasure of the operator. This carries it into the forming-jaws, which bend it to the desired curvature—the forming being effected by pinching the metal in curved jaws.

The essential features of the pipe-machine are a guide-table for the skelp, adjustable to the desired angle, feed-rolls to pass it forward with an intermittent progress, so that it shall advance when the hammer is raised and be at rest when the hammer falls: a former to curve the metal to the desired radius, also adjustable: a furnace to heat the metal; a hammer to weld it and an anvil to support the pipe and receive the shock of the hammer-blows. No mandrel is used. The pipe in the forming-process is held in place by a pipe mold, which is a cylindrical shell within which the pipe rotates as the stock is fed in. The anvil is of considerable mass, steel-faced, and extends the entire width of the skelp. The hammer is light, and at normal speed strikes 160 blows per minute. The heating is done in a furnace so constructed as to heat both the edges to united for the space of several inches ahead of the point at which the welding is effected. The upper skelp enters the furnace flat, and the lower skelp curved, having already been through the forming jaws. The heat is imparted by one or two blowpipes of water-gas and air discharging upon the metal through passages of suitable form in the refractory lining of the furnace. One gas-flame has been found sufficient, but two work better; and besides being more convenient to control, they heat the metal more rapidly and permit an accelerated feed. As very little gas is wasted, the greatest economy attends the most rapid production of pipe, irrespective of the quantity burned, which in any case is about 30 feet per foot of welded seam. The speed of production depends, as stated, upon the thickness of stock to be heated, and the relation of width of skelp to diameter. It averages a foot per minute to each machine, and it is probable that this average can be raised considerably. The machines are so nearly automatic in operation that very little skilled labor is needed in running the plant. The operator has his gas, air and feed under control by convenient means, and varies their relations until he has them just as he wants them. He can see the edges as they emerge from the furnace, and about all the skill he needs is that which will enable him to judge by its color whether the iron is above, below or at the welding heat. Unskilled labor prepares the stock and removes the finished product. The ends of the pipe are cut square by suitable machinery without reversing, and after testing and treating with asphalt, the pipe is ready for shipment. As might be supposed, all the difficulties of mechanical development have centred in the pipe-machine. To make this satisfactory in operation has been no more serious task than is usually entailed in the effort to make old mechanical motions perform



MACHINE FOR THE MANUFACTURE OF SPIRALLY WELDED TUBING.

new functions. It has been accomplished within eighteen months; and if the machines for the several sizes completed are not yet perfect, they have at least reached the condition of practical excellence in operation which gives assurance that they can be multiplied with profit. Six have already been built, with a range in diameters of from 4 to 16 inches, and others are in progress which, as before stated, will extend the range to 30 inches.

(TO BE CONTINUED.)

ON THE DRESSING OF NON-BESSEMER ORES.*

By G. W. Maynard and W. B. Kunhardt.

(*Concluded from page* 232.)

DRESSING TESTS.

Dephosphorization is not the particular aim of the Chateaugay work, as the crude ore there runs well within the Bessemer limit for phosphorus. But the removal of this baneful ingredient will often be the point on which success hinges. When it occurs only in the gangue, and not too finely disseminated, its more or less complete elimination by dressing is a natural and almost foregone conclusion. Concentrating tests that have recently been made by the writers bear upon this subject and point to possible favorable effects obtained by calcining. An account of the work may therefore interest some readers.

The first ore to be tested was that of the Beach Glen mine, of Northern New Jersey. The ore is a hornblendic granite, heavily charged with coarse grains of magnetite. The mine was carefully sampled, and after some preliminary tests with a hand-jig, a 20-ton average lot of lean ore was shipped to Chateaugay, where, through the courtesy of Mr. Williams, President, and Mr. Inman, General Manager, of the Chateaugay Ore and Iron Company, every facility was furnished for making a mill-run. The raw lump ore was passed successively through a Challenge rock breaker into a Blake multiple-jaw crusher, set to a quarter inch. As for special reasons close adherence to Chateaugay practice was desired, the ore was not sized further than to reject all pieces larger than quarter inch. In this condition the crushed rock was fed continuously to a Conkling jig. The work, when once begun, was carried on without interruption until the conclusion of the test, which occupied four hours. Samples of the crude ore running into the jig, and of the concentrate running out of the ore chute, were taken every two minutes. The tailings were sampled in the same intervals at the point where they discharged from the jig, and also 25 feet distant in the waste sluice. Each sample was put through a Lucop mill, crushing through an 80-mesh screen, after which it was quartered down for analysis with the following results:

TABLE I.

	Crude ore.	Concentrate.	Tails at jig.	Tails in sluice.
Iron, per cent ...	41·75	65·50	24·92	21·38
Phosphorus, "	0·0643	0·0·24	0·0799	0·0745
P in pig-iron, "	0·154	0·0342	.....	.....

These figures show an increase of 56.8 per cent. in the proportion of iron in the concentrate over that in the crude ore, and a decrease of 65·6 per cent in the phosphorus. By this dressing, therefore, a non-Bessemer ore was raised to the Bessemer standard. On the other hand the tailings run so high in iron that the yield, by weight, of the concentrate, as calculated from the above data, amounts only to 41.4 per cent. of the crude ore. In other terms, 2·4 tons of ore are required to produce one ton of concentrate. Even with this showing, at an estimated dressing cost of 25 cents per ton of crude ore, and allowing for the extra cost of mining 2·4 tons of rock to obtain only one ton of product, there are many localities where such ore can be worked to fair profit. With improved methods, particularly with systematic sizing, by which fine and coarse material are separated for jigging, better results will accrue. Moreover, the coarse-grained texture of many magnetic ores allows of their thorough disintegration without crushing down to quarter-inch, so that a portion, at least, of the dressed product will generally be of fairly coarse size.

The dressing of an Adirondack magnetite, exhibiting much finer mineralization than the New Jersey ore, presented an attractive, and, as it proved, an instructive problem.

The rock is an intimate mixture of magnetite, hornblende, quartz, mica, apatite and garnet: by simple macroscopic examination it appears to be a hornblendic gneiss carrying a large proportion of magnetite. The intimate mixture of mineral and gangue pointed to fine crushing for disintegrating the ore, but as blast-furnace practice limits the fineness of the product, a condition was thereby imposed at the outset on any dressing operations. In making the tests about to be described, it has been assumed that ore sizes as fine as 16 to 35-mesh could be marketed if mixed in small proportions with coarser material, but that all mineral reduced to particles finer than a 35-mesh size must be regarded as loss.

As only 1900 pounds of ore were available for experiment, the work was necessarily done on a small scale. The investigation began with a series of crushing and sizing tests, the purpose of which was (1), to classify the ore for subsequent jigging; (2), to ascertain the proportion of waste fines thereby produced; (3), to determine how this waste could be minimized; (4), to find, in connection with jig-tests, how coarse a grade of ore could be successfully concentrated. (The details of these tests are shown in the original paper published in the School of Mines *Quarterly*, in a number of tables from which the following results are taken):

Crushing Test 1.—A small lot of hand-broken ore, put through a jaw-crusher set at ¼ inch and then carefully examined and jigged, showed that no considerable proportion of magnetite occurred separated from the gangue in any size coarser than 6-mesh. In this trial-test, 53 per cent of all the ore was rejected by a 6 mesh screen, while 17 per cent passed through a 30 mesh screen. Such a large proportion of waste fines resulting from comparatively coarse crushing was taken as a caution to proceed by very gradual, successive size reductions in attempting to bring all the rock down to a 6-mesh size without producing an excessive amount of waste fines.

Crushing Test 2.—Accordingly the next ore lot was broken down by hand to 2½ inch pieces and fed to a small Dodge breaker set at $1\frac{3}{16}$ inches when open, or 1 inch when closed; the crushed rock was sized, and all material refused by a 2-mesh screen, amounting to 76·5 per cent of the entire lot, and consisting largely of 1½-inch pieces, was passed through 18-inch rolls set to $\frac{11}{16}$ inch and sized: the over-sized classes (coarser than 6-mesh (were crushed successively through $\frac{11}{16}$, $\frac{5}{16}$, $\frac{5}{16}$, $\frac{3}{16}$, $\frac{1}{16}$ and $\frac{1}{32}$ inch roll passes, the fines being screened out each time, and as a final result 84 per cent of jigging ore (stuff from 6–35 mesh) was produced with a loss of only 15 per cent of waste fines. Further tests were required to determine whether this record could be maintained with fewer crushing passes.

Crushing Test 3.—Two hundred and forty two pounds of hand-broken ore, 1⅛ to 1¼ inch in size, were put through four successive roll passes, respectively $\frac{13}{16}$, $\frac{5}{16}$, $\frac{3}{16}$ and $\frac{1}{16}$ inch wide, the fines being screened out as before, and care taken to have a unit.

Compared with the results of test (2) the more rapid size reduction of this last test yielded only 73·7 per cent of "jigging ore," as against 84 per cent before obtained; while the waste fines were increased from 15 per cent to nearly 25 per cent. Altogether these results were regarded as too unpromising to warrant further experiments at rapid reduction of the raw ore. Though the rock is not refractory, its more or less gneissic character gives it a lamellar fracture; many of the crushed pieces are thin, but broad and flat, so that large percentages of oversized products are obtained even when the rolls are closely set. To determine whether an improvement in this respect could be effected by calcining was the object of the next test.

Crushing Test 4.—Two hundred pounds of ore, partly in small lumps and partly broken by hand to 1½-inch pieces, were heated in a reverberatory furnace to incipient redness, and then crushed and sized. The crushing passes were through a Dodge breaker set at 1⅜ inches open and 1⅛ inches closed, and through rolls set successively to ⅝, ⅜ and ⅛ inch. Each lump of ore appeared to be calcined to a depth of about ⅜ of an inch, but the kernels showed no evidence of oxidation. All the ore, however, proved to be extremely friable, crushing with greatest ease. The products still exhibited the lamellar fracture of the rock, though not to the same degree as the raw ore.

By this test 82·5 per cent of jigging ore was produced with a loss of only 15·7 per cent of waste fines. These figures are nearly as good as those of test (2), while from an economical standpoint the last result is far more satisfactory, since it is obtained with but three successive roll passes instead of six. A comparatively thorough disintegration of the ore was observed in the earlier passes, and this naturally suggested in the next experiment an attempt at more rapid reduction of the calcined ore, though this same method had proved unsatisfactory in working upon raw ore.

Crushing Test 5.—Two hundred pounds of ore in "small lump" size—pieces averaging 6 inches by 4 inches by 2½ inches—were calcined as in test (4), but none of the lumps were hand-broken before calcination. The kernels remained apparently unaltered, though all the ore proved, as before, to be very friable. The rock was crushed by comparatively rapid reduction, through a Dodge breaker set at 1¼ inches and rolls set to ⅜ and ⅛ inch.

As a final result 83 per cent of jigging ore was obtained at a cost of 16½ per cent of waste fines, with virtually only two roll passes, and one rock-breaker pass. These figures are substantially the same as those of the preceding test: the last experiment seems, therefore, to warrant the inference that *results may be attained in rapid reduction of the calcined ore, which were altogether beyond reach in working upon the raw ore.* With better calcination a still further improvement might reasonably be expected.

Conclusions upon Crushing.—From the foregoing crushing and sizing tests the following conclusions with regard to the treatment of the ore were drawn.

1. The ore should be calcined sufficiently to make it quite friable and reduce very perceptibly the tendency to lamellar fracture. The advantages of calcining are: (*a*), making the ore so friable that it breaks up thoroughly in comparatively coarse passes of the crushing machinery, and in this way diminishes the production of waste fines; (*b*), increasing the friability of the gangue in relatively larger measure than that of the magnetite, and so raising the percentage of iron in the coarser jigging sizes as shown by Table II.; (*c*), increasing the capacity of the crushing machinery at least two or threefold; (*d*), correspondingly reducing the wear of the crushing machinery per ton of ore treated; (*e*), improving the shape of the ore grains for jigging—there being fewer thin flat pieces produced than in crushing raw ore; (*f*), reducing the percentage of sulphur by more or less complete oxidation of any pyrites present.

TABLE II.

Mesh.	6-8	8-10	10-12	12-16	16-20	20-35
Raw ore, percentage of iron..	43·66	44·25	46·28	46·42	—	—
Calcined ore, " " ..	50·19	50·19	49·03	47·37	40·56	32·50

2 The calcined ore should be put through a large rock-breaker, set to about two inches when closed, and then through 40- or 42-inch rolls, set to three eighths inch, and capable of taking hold of the coarsely broken rock. The over sized ore (coarser than 6 mesh) should be put through a second pair of rolls, set to one eighth inch; the small lot of ore which is refused by a 6-mesh screen after passing the second rolls should be returned to that pass.

By crushing calcined ore in this manner, 83 to 85 per cent of the total ore will be obtained in jigging sizes at a loss of waste fines not exceeding in practice 16 per cent. An analysis of an average sample of waste fines yielded 31·4 per cent of metallic iron, which is less than three fourths of the average iron contents of the ore, indicating, therefore, that in fine crushing the gangue breaks up more readily than the magnetite. Hence the production of 16 per cent of waste fines means a loss *not* of 16 per cent, but only of 12 per cent of the iron in the ore. As the latter contains according to the analyses of three separate samples an average of 44 per cent of iron, the actual loss by the production of fines in crushing will be 12 per cent of 44, or 5·3 units of iron. This figure is a maximum, and it should not be difficult in good practice to keep within a lower limit.

Jigging Tests.—The classified ore obtained in the foregoing operations was sorted on a small two-compartment, fine-grain Hartz jig, with sieves measuring 7 × 18 inches. A mineral bed of magnetite, usually

* From the *School of Mines Quarterly.*

one size coarser than the particular ore-class treated, was used upon each jig sieve. The heads and middlings passed through the sieves into the first and second hutches respectively, and the tailings overflowed the lower dam as usual. The products from each test were dried, weighed and carefully sampled for analysis. It was found by special determination that all the phosphorus of the ore occurred in the gangue, and this facilitated much of the analytical work. In order to obtain a fair quantity—say 65 to 100 pounds—of ore for each test, it was found necessary in several cases to mix together the raw and partially calcined ore of the same sizes.

The aim with which the tests were begun was to produce a Bessemer concentrate (Fe, 60 per cent and over; P, 0·06 per cent or less), and at the same time make tailings which would run sufficiently low in iron to permit of their being discarded without great loss. Four successive tests on 6, 8, and 10-mesh raw ore seemed to demonstrate the futility of any such attempt. The work was slowly and cautiously done on the first sieve of the jig, but with the invariable result that a 60–62 per cent concentrate could not be produced without a loss of 21–25 per cent of iron in the tailings. With such a showing it was evident that, at least in its coarser sizes, the ore could not be satisfactorily dressed without forming a middling product. The intimate mixture of the ore constituents, when considered in its bearing on the positive requirement for keeping to coarse concentrates, debarred the simplest solution of the dressing problem—*i. e.*, the direct separation of magnetite (specific gravity, 5) from gangue (specific gravity, 2·7–3·2). The experiments point to far more delicate work—namely, the separation of a high-grade magnetite, carrying not more than 0·06 per cent of phosphorus, from a leaner product probably higher in phosphorus, which in turn has to be sufficiently freed from gangue to raise it to a marketable grade. Accordingly, the aim of all further work was to produce for heads, a Bessemer concentrate; for middlings, a foundry concentrate; and for tails, just as poor a product as possible.

One of the above-mentioned tests was made with 8–12 mesh ore. A close examination of the tailings revealed the presence not only of "mixed grains" (part mineral and part gangue) but also of many particles of 10–12 mesh magnetite which furnished additional argument, if any were needed, for the necessity of close sizing. The next eight tests on 6, 8, 10, 12 and 16-mesh ore served to determine the most favorable conditions for working the small jig on each of the several ore sizes. These tests were followed up by a second series, the results of which are given in Table III.

TABLE III.

	a.		b.		c.		d.		e.		f.	
Mesh ..... Condition....	6-8 Calcined.		8-10 Raw & calc.		10 12 Raw & calc.		12-16 Raw & calc.		16- 0 Calcined.		20-35 Calcined.	
	Fe	P	Fe	P	Fe	P	Fe	P	Fe	P	Fe	P
Ore.....	50·41	0·103	47 73	0·082	45·83	0·087	46 38	0·068	40 56	0·078	32·56	0·105
Heads	64·54	0·058	62·57	0·077	64·41	0·063	63·33	0·060	64 47	0·058	63·68	0·040
Middlings...	55 82	0·098	51 44	0 094	57·58	0 080	58 47	0·072	49·84	0·093	43 25	0·157
Tails	12·88	0·110	16·31	...	18 17	....	12 67	0·058	5·95	0·063	4·86	...
(a.) 89 pounds of ore jigged. Proportion of heads to middlings 30·4 to 69·6												
(b.) 171 " " " " " " 36·2 " 63·8												
(c.) 96 " " " " " " 38·0 " 62·0												
(d.) 63 " " " " " " 44·8 " 55·2												
(e.) 62 " " " " " " 47 0 " 53·0												
(f.) 55 " " " " " " 63·8 " 36·2												

An examination of this record shows the possibility of obtaining by jigging from all the calcined ore between 6 and 35 mesh the following products:

	Iron.	Phosphorus.
Heads..... 63	per cent and over.	0·063 per cent or less.
Middlings.. 55	" "	0·095 " "
Tails..... 16	" "	.....

These figures are not averages computed from the table, but they represent results which are easily within reach of a laboratory jig. In practice, with large machines, heads running 64 per cent iron and not more than 0·055 per cent phosphorus ought to be obtained without difficulty from the calcined ore. The advantage of calcining in thereby enriching the coarser ore sizes has already been pointed out. It is the coarse sizes which are least easy to treat because of the large proportion of mixed grains present; the enrichment occurs, therefore, just where it proves of greatest benefit. Tests *b* and *c* would probably make a still better showing than they do if the respective ore classes had been composed of calcined stuff only.

Phosphorus is seen by Table III. to concentrate in the middlings, which is not surprising, as apatite is among the specifically heaviest of the gangue minerals; but the fact appears to indicate also an intimate association of iron and phosphorus in the "mixed grains" of the foundry concentrate. The presence or absence of sulphur was disregarded in the tests, as the amount of sulphur reported in the ore had no economic importance.

As previously observed, the jig products of each test were weighed (dry) to check results, but it would obviously be wrong to deduce from these weights the quantities of concentrates and tailings obtainable in practice. The partly jigged ore upon the sieves is a disturbing factor of appreciable magnitude in the laboratory results. It can not be eliminated by simple subtraction. The quantity of concentrates—heads as well as middlings—formed in an experimental test with a small lot of ore evidently depends in large measure on the ratio of the total weight of the test lot to that required for filling the sieves. It is only the comparative proportions, therefore, of these two grades of concentrates, obtained in the laboratory, which deserve attention: with due reservation they serve to approximate the quantitative relation between heads and middlings in practice. In seeking to determine a fair average of these proportions, the gradually increasing ratio between the successively finer products of the experimental heads and middlings can not escape notice. The change is evidently due to the smaller percentage of "mixed grains" in the finer, more thoroughly disintegrated ore classes. Figuring upon the results of test 5 it appears that 15·6 per cent of all the jigging ore would in practice be 20–35 mesh stuff. This alone, as can readily be seen, would raise the proportionate production of heads appreciably; in the present case, however, it was thought preferable to attach but little weight to this favoring circumstance, and rather adopt figures which were well within the mean of results obtained with the coarser sizes. A proportion of heads 36 per cent to middlings 64 per cent was taken as a conservative basis for computing practical results.

Conclusions upon Jigging.—The data for estimating the yield per gross ton of ore may be recapitulated as follows:

	Per cent.
Raw ore averages	44 iron.
Waste fines.....	16 ore.
Heads average	63 iron.
Middlings "	55 "
Tails "	16 "
Percentage proportion of heads to middlings.....	36 to 64.

By sifting out the poor waste fines produced in crushing, the raw jigging ore is enriched to 46 per cent iron. The additional enrichment of the coarser sizes by calcining is balanced by the impoverishment of the finer classes, and hence does not enter into the calculation. One gross ton of mine ore therefore yields:

Waste fines.....	359 lbs., or	16·0	per cent, carrying	178	lbs. iron.
Bessemer concentrate...	484 "	21·6	" "	305	"
Foundry concentrate ..	869 "	38 4	" "	474	"
Waste tails..... ..	537 "	24·0	" "	86	"
	2240	100·0		983	
Unaccounted through discarding fractions.....				2	"
				985	"

44 per cent of 2240 = 985 "

A ton of concentrates (Bessemer and foundry) would by these figures be obtained from 3730 pounds, or 1·66 tons of ore.

The limited quantity of material available for the foregoing experiments precludes any generalization upon the results; but as these will at least prove suggestive they have not been considered unworthy of record.

Driven Well Patent.—The Supreme Court of the United States, on the 4th inst., denied the second application for a rehearing of the "Driven Well" cases.

BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in another part of the Journal.]

Annual Report of the State Geologist of New Jersey for 1887. By Geo. H. Cook, State Geologist. Published by the Geological Survey of New Jersey, New Brunswick, N. J.

The Geological Evidences of Evolution. By Angelo Heilprin, Professor of Invertebrate Paleontology at the Academy of Natural Science, Philadelphia, Pa. Published by the Author. 1888.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

The following is a list of the patents relating to mining, metallurgy, and kindred subjects, issued by the United States Patent-Office.

PATENTS GRANTED APRIL 3D, 1888.

380,321. Mold for Casting Ingots. Thomas Hampton and John Facer, Barrow-in-Furness, County of Lancaster, Eng., Assignors of one-third to Philip S. Justice & Co., Philadelphia, Pa., and London, Eng.

380,325. Engine-Valve. Edwin M. Humstone, Hartford, Conn., Assignor to James Ferguson, Bridgewater, Mass.

380,328 and 380,329. Valve-Gear. Erasmus D. Leavitt, Jr., Cambridgeport, Mass.

380,330. Pump. Erasmus D. Leavitt, Jr., Cambridgeport, Mass.

380,340. Incrustation Preventive. John Mullica and Benjamin F. Mullica, Williamstown, Assignors of one-half to Jonathan P. Stanger and Henry Rowen, both of Glassborough, N. J.

380,359. Gaseous Fuel Burners. William T. Smith, George A. Ely and Thomas A. Bryan, Baltimore, Md.

380,375. High-Speed Engine. Peter W. Willians, Thames Ditton and Mark H. Robinson, Kingston-on-Thames, County of Surrey, Eng.

380,382. Electro-Magnetic Signaling Device for Mines. Logan McKnight Bullitt and Oscar C. Greene, St. Paul, Minn.

380,384. Friction Clutch. Hiram C. Crowell, Erie, Pa.

380,388. Barb Wire Fence. J. W. Griswold, Troy, N. Y.

380,393. Nut-Making Machine. William H. Johnson, Racine, Assignor to the Elastic Nut Co., Milwaukee, Wis.

380,398. Composition for Lining Petroleum Tanks and Similar Vessels. Patrick Molyneux, London, Eng.

380,402, 380,403. Production of Disulpho and Dicarbo Acids of the Diamidoazo-Benzilines. Ludgwig Paul, Furstenberg on-Oder, Prussia, Germany.

380,413. Die for Upsetting Metal Bars. William R. Webster, Athens, Pa.

380,414. Method of Spreading the Ends of Rectangular Metal Bars. William R. Webster, Philadelphia, Pa.

380,432. Pulverizer. Philetus W. Gates, Chicago, Ill.

380,442. Process of Refining Iron. Gustav Lindenthal, Pittsburg, Pa.

380,444. Pressure Regulator and Cut-Off. Owen J. McGann, Pittsburg, Pa.

380,466. Pump. Denat Waldkircher, Sandusky, O.

380,474. Cut-Off Valve. Roland Bentley, Dresden, and Thomas Ford, Longton, County of Stafford, Eng.

380,475. Air-Injecting Device for Boiler Furnaces. Elijah B. Cornell, Philadelphia, Pa.

380,524. Process of Desilverizing Lead Bullion. Herman H. Schlapp, Pueblo, Colo.

380,569. Dike or Breakwater. Lewis M. Haupt, Philadelphia, Pa.

380,572. Nail-Plate Feeder. Chas E. Houghton, Northumberland, Pa., Assignor to Horace R. Johnson and Ida M. Houghton, both of same place.

380,573. Barbed Fence. Orlando Huffman, Friend, Neb., Assignor of one half to Hamilton W. Hewit, same place.

380,579. Means for Operating Feed-Rolls. Leonard Kissner, Lancaster, Ohio, Assignor to the Hocking Valley Manufacturing Company.

380,580. Machine for Folding Sheet Metal. Nicola Koenig, North Tarrytown, Assignor to Jacob Brombacher's Sons, New York, N. Y.

380,593. Composition for Preserving Wood, etc. Pierre L. Quarante and Elisabeth d'Escalonne, Paris, France.

380,596. Nail-Making and Distributing Machine. Freeborn F. Raymond, 2d, Newton, Mass.

380,601. Traction Engine. Hernando O. Sickler, Buffalo, N. Y.

380,615. Oil or Artesian Well Pumping Mechanism. Henry H. Argue, Derrick City, Pa., Assignor of one half to Richard W. Argue, same place.

380,625. Apparatus for Transferring Pig Iron from its Bed. William H. Fredericks, Johnstown, Pa.

380,637. Hoisting Machinery. Richard Schulz, Tezel, near Berlin, Germany.

380,661. Steam Valve. David H. Rice, Brookline, Assignor to James Ferguson, Bridgewater, Mass.

380,668. Method of Forming a Rail Brace from T-Metal. Axel A. Strom, Austin, Ill.

380,669. Rotary Water Meter. James A. Tilden, Hyde Park, Mass., Assignor to the Hersey Meter Co. Portland, Me.

380,670. Apparatus for the Recovery of Soda. John E. Warren and Francis A. Cloudman, Cumberland Mills, Me., Assignors to S. D. Warren & Co., Boston, Mass.

REISSUE.

10,918. Steam Engine Indicator. Albert L. Ide, Springfield, Ill.

THE METALLURGY OF STEEL.*

By Henry M. Howe.

(*Continued from page 237.*)

It is not clear why Troost and Hautefeuille obtained so little gas, for they employed a temperature (800° C.) approaching that of Graham's experiments, and they exhausted their specimens during very nearly eight days, while his exposures were but from one to seven hours. Possibly the shape of the pieces treated may have had some influence: Graham employed fine wires, number 23 gauge or about ·025 inch (0·64 mm.) in diameter: Troost and Hautefeuille treated cylinders weighing 500 grammes each, while Parry employed sometimes "clean lumps," sometimes drillings. Possibly, too, part of the gas obtained by Graham came from some source other than the iron.

Clearly the gases which the iron would have released if previously comminuted form a part of those which it gives off when heated in vacuo, and how large a part we cannot now tell.

§ 206. QUANTITY OF GAS ABSORBED.—Graham and Parry both found that previously untreated iron evolved much more hydrogen and carbonic oxide when heated in vacuo than it reabsorbed when heated in these gases.

Thus, Parry extracted as much as 205 volumes of hydrogen and 135 of carbonic oxide from a specimen of cast-iron which only reabsorbed 20 volumes of hydrogen and which absorbed no carbonic oxide:[a] and in no case did he induce iron to absorb more than 22·4 volumes of hydrogen and 4·5 of carbonic oxide. Graham extracted nearly thrice as much gas on exhausting previously untreated iron as he could later obtain from it on twice exhausting it, first after soaking in hydrogen and then after soaking in carbonic oxide.[b]

But, at least in case of hydrogen, it is not certain that in their absorption experiments the metal became saturated with gas: possibly if soaked long enough in hydrogen it might have absorbed as much gas as it previously emitted.

Troost and Hautefeuille obtained results diametrically opposed to these. They extracted from 2·3 to 12·8 times as much hydrogen and from 1·3 to 5·3[c] times as much carbonic oxide from iron which had been soaked in these gases as from the same specimens in their natural state.[d]

The hydrogen which previously exhausted iron absorbs when soaked in this gas is again and usually fully expelled on heating in vacuo: specimens which absorbed 30 and 14·1 volumes by direct measurement, subsequently emitted 20 and 13·4 volumes of hydrogen.[e] A third specimen absorbed 13 volumes, but when reheated in vacuo evolved only 10·5, and further heating extracted no more gas, perhaps because the temperature at which the iron was exhausted was lower than that at which it soaked in hydrogen.[e] In the sole case in which Parry directly observed the absorption of carbonic oxide by iron only 71% of the absorbed gas could be later extracted in vacuo: but part or indeed all of the apparent absorption of carbonic oxide may have been due to the absorption of its dissociated elements.

§ 207. THE COMPOSITION OF THE GASES EVOLVED BY IRON is detailed in Tables 54 to 57 and 70 A, and is condensed in Table 70.

A. *In general* we may divide the gases into two groups,

I. The carbonic oxide group, comprising carbonic oxide and acid, and

II. The hydrogen group, comprising hydrogen and nitrogen.

Carbonic acid is not found in the boring gases, and it occurs but sparingly in those from the moulds and from heating in vacuo. It may arise from the oxidation of part of the carbonic oxide evolved, and, as the volume of carbonic acid is the same as that of the carbonic oxide from which it is derived, we may consider these gases jointly.

B. *The carbonic oxide group* usually constitutes somewhat more than half of the mould gas from basic Bessemer steel which has been recarburized with spiegeleisen or ferro-manganese or both, but less than half of the mould gases from all other varieties of iron and of the vacuum-extracted gases from all varieties of iron, and is invariably almost completely absent from the boring gases, which consist essentially of the hydrogen group. Spiegel-recarburized basic steel, be it remembered, is distinctly a scattering rather than a rising steel. (§ 202 C, Table 71.) For brevity I shall call "spiegel-recarburized" steel both that recarburized with spiegeleisen and that recarburized with ferro-manganese, to distinguish them from that recarburized with ferro-silicon.

C. *In the hydrogen group* hydrogen almost invariably preponderates, and in the great majority of cases greatly preponderates over nitrogen, whether in mould, boring or vacuum-extracted cases, with the single exception of the mould-gases from spiegel-recarburized basic Bessemer steel, which usually contain far more nitrogen than hydrogen. In most of the other classes the ratio of hydrogen to nitrogen usually lies between 1·5 : 1 and 6 : 1. But, in the vacuum extracted gases from all classes of cast-iron tested, and in the mould gases from certain classes of cast-iron this ratio is much higher, rising often to 25 : 1 and sometimes to 100 : 1. Indeed nitrogen is sometimes reported as wholly absent.

D. Two varieties of iron, then, differ from the rest in the composition of the gases which they yield, spiegel-recarburized basic Bessemer steel, whose mould gases are usually exceptionally free from hydrogen, and cast-iron, whose vacuum-extracted and mould gases are exceptionally free from nitrogen. All the other classes of iron tested evolve on solidifying and in vacuo gases of one common type of composition, and on boring gases of a second type, differing from the first in lacking carbonic oxide. These normal types and the exceptional ones just described are summed up in Table 75. It is to be understood that these numbers represent not the extreme but the usual limits of composition.

TABLE 75.—DOMINANT TYPES OF COMPOSITION OF GASES EVOLVED BY IRON.

Metal.	Time of escape.	Composition of gases.		Composition of H group.	
		CO group.	H group.	H.	N.
Spiegel-recarburized basic Bessemer steel.	In moulds	55@75%	25@45%	10@60	40@90
Cast-iron	In moulds	37@58	42@63%	75@99	1@25
"	In vacuo	0@53	47@100	92@100	0@ 8
Normal compositions, all classes except the above	Moulds and vacuo	12@50	50@88	60 90	10@40
	Boring	0@4·3	95 7@100		

But withal the compositions thus referred to a common

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[a] 10, 46, 60, Tables 53-7.

[b] Numbers 26, 33, 34, 54 and 67, Idem.

[c] Or from 1·05 to 4·3 times as much, if we include the carbonic acid with the carbonic oxide.

[d] See numbers 11, 15, 16, 17, 18, 30, 31, 36, 47, 50, 53, 61, 63,65, Tables 56-7.

[e] Numbers 12-43, 13-45, 32-52 and 35-66, Tables 56-7.

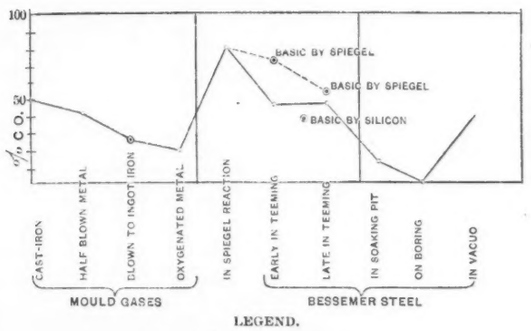
[f] It has been attempted to prove that the hydrogen found on boring proceeds not from the pores thus laid bare but from the decomposition of water: this will be discussed in § 218.

type differ considerably among themselves, and the relations of their variations to those of the source, history, composition and structure of the mother metal are in general little understood. In many cases the gases emitted under like conditions by similar specimens of the same variety of iron differ as much among themselves as those from different varieties of iron.

E. There are, however, certain strongly marked features in the composition of the gases evolved by cast-iron and by the intermediate and finished products of the Bessemer and open-hearth processes, which characterize the different stages of these processes. I attempt to explain certain of these in § 217. They are illustrated in figure 14. In sketching them I have comparatively few analyses to guide me: further light may wholly change the aspect, and my present sketch is merely provisional.

INFLUENCE OF STAGE OF MANUFACTURE ON THE PROPORTION OF CARBONIC OXIDE IN THE MOULD AND OTHER GASES. PROVISIONAL SKETCH.

Fig. 14



LEGEND.

○ Acid Bessemer Process.
⊙ Basic Bessemer Process.

Considering first, not the gas evolved in the converting operation itself but that which escapes when a given product is removed from the converter and allowed to solidify undisturbed in moulds, we note that the proportion of carbonic oxide diminishes with progressing decarburization, from about 50% in case of cast-iron to about 44% in case of half-blown Bessemer metal; thence to about 27% in case of ingot iron obtained by interrupting the blow and without recarburizing,[a] and thence to about 20% in case of oxygenated Bessemer metal. It is somewhat higher in case of oxygenated open-hearth metal, viz.:—about 47%. (Be it remembered that Snelus[b] and Tamm[c] independently found that the proportion of nitrogen to hydrogen in the gases escaping from the Bessemer converter diminished greatly during the blow, in Snelus' case from 98·4 : 1 to 30·7 : 1 and in Tamm's from ∞ : 1 to 48 : 1, teaching that at least in Tamm's case, the metal rapidly absorbed hydrogen from the blast during the early part of the blow, perhaps again emitting towards the end of the operation a portion of that absorbed at its beginning).

To our oxygenated metal, which of itself evolves gases containing about 20% of carbonic oxide, we add spiegeleisen, when of course a violent evolution of gas, containing about 80% of carbonic oxide, occurs. As the resulting steel gradually cools, the proportion of carbonic oxide in the escaping gases steadily diminishes from 80% during the spiegel reaction to 72% during early teeming and 60% during solidification in case of spiegel-recarburized basic Bessemer steel; to 46% in the mould gases of acid Bessemer steel (in acid steel the proportion of carbonic oxide remains nearly constant during teeming and solidification, and 32% in those of silicon-recarburized basic steel, (No. 91, Table 55; No. 7, Table 70A)[d] Thence it declines to 13% in the soaking-pit gases of the solidified ingot, and finally thence to about 1% in the gases released by boring the completely cooled steel. But when this is again heated in vacuo the proportion of carbonic oxide rises to 25 or even 50%, and the gas found on boring blisters in the cold metal also contains a large proportion of carbonic oxide.

To sum this up, the proportion of carbonic oxide in the mould gases from products taken at different stages of the Bessemer process gradually diminishes, reaching a minimum in oxygenated metal: turning from the mould gases to those of the spiegel reaction we find that carbonic oxide here leaps to a maximum, to again decrease as the recarburized molten metal cools and sets, becoming nil in the boring gases, but again rising when the cold metal is reheated.

F. *The influence of the composition of the metal* on that of its mould gases is not in general easy to trace. We have indeed just noted that those of cast-iron, with its high proportion of carbon, contain comparatively little nitrogen: and the preceding paragraph shows striking changes in the proportion of carbonic oxide, due however rather to the history and treatment of the metal than to its composition. The gases of steel of different compositions, but produced under substantially like conditions, might be expected to exhibit corresponding differences, those of spring differing from those of rail steel, and both from those of ingot iron: but I have not succeeded in confidently tracing such relations, perhaps because we have so few analyses that the influence of the composition of the mother metal is masked by that of other variables.

G. *The influence of the recarburizing additions* on these gases is more conspicuous. We have just noted that if basic Bessemer steel is recarburized with spiegeleisen, its mould gases are rich in carbonic oxide, but not if it is recarburized with ferro-silicon. The influence of silicon is farther illustrated by the fact that if we add ferro-silicon to molten basic ingot iron which, though already partially recarburized with 2% of ferro-manganese, scatters actively and doubtless gives off chiefly carbonic oxide (at least this has always been the chief gas from other specimens under like conditions) the scattering now completely stops, and the mould gases hold only 44% of carbonic oxide plus acid. A few blowholes may still form however.[e]

§ 208. THE COMPOSITION OF THE BORING AND VACUUM-EXTRACTED GASES.—I have succeeded poorly in tracing the relations between the composition of these gases and the source, structure and composition of the mother metal.

(TO BE CONTINUED.)

NOTE.—The publishers of the ENGINEERING AND MINING JOURNAL will thank the readers of this article if they will promptly call attention to any inaccuracies they may observe in it.

[a] Nos. 88-89, Table 55. Carbonic acid is here included.
[b] Journal of the Iron and Steel Institute, 1871, II., p. 257.
[c] Ledebur, Handbuch der Eisen-Hüttenkunde, p. 927.

[d] In No. 90, Table 55 = No. 8, Table 70A, the metal was recarburized with ferro-silicon and ferro-manganese, yet its mould gases held from 44 to 64·6% of carbonic oxide: in this case, however, the recarburizing additions were made in the converter, and the silicon was oxidized by the phosphoric acid of the slag, so that the oxygen of the metal was chiefly removed by carbon. In No. 91, however, the action of the slag was diminished by adding the recarburizers in the ladle, and in this case, as shown in Table 70A, the oxygen of the metal was taken up by silicon and manganese.
[e] No. 6, Table 70 A, § 202.

PERSONAL.

Mr. J. C. Bayles, who has been the editor of the *Iron Age* for the past twenty years, has retired from that position.

William McMurtrie, inside foreman at the Knickerbocker Colliery, has been elected Mine Inspector for the Shenandoah district, Pa.

Mr. Andrew Scott, who for twenty years has been superintendent of Marshall's foundry, Pittsburg, Pa., died at that place on the 3d inst., aged seventy-five years.

Captain Hooper has resigned his position of manager of the slate quarries at Arvon, Mich., in order to accept the position of General Superintendent of the Beaver Mountain silver mines, near Port Arthur, Ontario.

Mr. Caleb Wheeler, a retired coal operator and one of the first men to develop the coal interests of the anthracite region, died at Reading on the 2d inst., aged eighty-three years. He operated the first coal mine nearly sixty years ago.

We are advised that the recent announcement by cable of the death of Baron Ferdinand von Richthofen, referred to in our issue of March 24th, was intended for another distinguished member of the extensive family of Richthofens—the jurist, Baron Karl von Richthofen.

Mr Arthur B. Clarke has been elected President of the Old Dominion Iron and Nail-Works Company of Richmond, Va.; Mr. Douglass Baird, who has been for 40 years superintendent of the works, Vice-President, and G. W. Catlett, long in the employ of the company, Secretary.

Mr. Oscar Lachmund, until recently with the Holden Smelting Company, of Denver, Colo., has been engaged by the Grand View Smelting Company, of Rico, Colo., to succeed Mr. Thos. O. Flueger, who has been connected with the company as metallurgist for several years.

Professor W. F. Jordan, director of the experiment station at Orono, has been tendered the position of director of the experiment station and professor of agriculture at the South Carolina Agricultural College at Columbia. It is said that he will not accept, but will remain at Orono.

General John Newton, Commissioner of Public Works, has been elected a member of the board of directors of the Panama Railroad, and it is said that as soon as the new board organizes he will be elected president. His duties will not intere with his promise to Mayor Hewitt to continue to act as Commissioner until after the Presidential election.

A memorial meeting was held in Washington, D. C., on the evening of the 5th inst., by the scientific societies of Washington in honor of Dr. Asa Gray. The following papers were read: Prof. J. W. Chickering, Jr., "Dr. Gray and His Life Work"; Dr. George Vasey, "Dr. Gray's Botanical Works, and Their Influence on Botanical Science"; Prof. L. T. Ward, "Dr. Gray and Darwinism"; Dr. C. V. Riley, "Personal Reminiscences of Dr. Gray."

Mr. Richard P. Rothwell, the managing editor of the ENGINEERING AND MINING JOURNAL, has been invited by the Hon. Carl Schurz, President of the United States Almanac Publishing Company, to write the essay on Mining and Metals for this publication, which is to be a comprehensive presentation of American products industries and commerce. From twenty to thirty thousand copies will be distributed all over the world by the consular officers of the United States under instructions of the Department of State.

The proposed meeting of the British Iron and Steel Institute in the United States has been postponed for a year. The reason given in an official minute by the secretary is that prominent members of the American iron trade have advised it, on the ground that public attention will be so largely absorbed by the Presidential campaign next fall that the meeting will not receive the consideration it deserves if then held. The visit of the Institute to this country, if present intentions are carried out, will be made in 1889.

FURNACE, MILL, AND FACTORY.

The Venezuelan government has issued a decree placing barbed wire on the free list.

The works of the Champion Blower and Forge Company, Lancaster, Pa., were burned on the 4th inst., with contents, including many valuable patterns.

The Wire Nail Association of the United States met in Pittsburg, Pa., this week, and decided to advance prices 10 cents per keg, or to $2.70 for car-load lots.

The new Floodwood furnaces of the Ohio & Western Coal and Iron Company, of Columbus, Ohio, are rapidly nearing completion, and will shortly be put in blast.

Mr. H. W. Hartman, of the Hartman Steel Company, Limited, of Beaver Falls, Pa., has disposed of his interest in that company to Andrew Carnegie, and retired.

Messrs. George C. Bell and Samuel J. Fields, comprising the Niagara Bridge Works Company, of Buffalo, N. Y., made an assignment on the 2d inst. to Lucien Hawley. There are no preferences except to the employés. The company has been doing considerable work in small iron bridges.

We are officially advised that the South Chicago Works of the North Chicago Rolling-Mill Company have again beat the record. The March product was 24,134 tons of ingots and 21,095 tons of rails in 49 turns. One furnace was out of blast or the product would have been larger still.

Messrs. McIntosh, Hemphill & Co., of Pittsburg, Pa., have completed a train of universal rolls for Carnegie, Phipps & Co., which is said to be the largest in the world. The total weight is 216,000 pounds, and with boilers and engines will cost $60,000. They are to roll armor plates from ingots weighing 30 tons.

Messrs. McIntosh & Hemphill, of Pittsburgh, Pa., have been awarded the contract of erecting the rail mill addition to the Duquesne steel mill, Duquesne, to be 700 by about 300 feet in dimensions. The original portion of the mill will not likely be placed in operation until after the settlement of the wage question in June.

The Greendale, or better known as the Crifts furnace, at Greendale, O., has been leased from the Columbus & Hocking Valley Coal and Iron Company by the Greendale Furnace Company, the officers of which are J. A. Long, President; C. H. Bordman, Vice-President and General Manager; D. F. Schaff, Secretary and Treasurer.

The Eureka Cast Steel Company, Chester, Pa., which made arrangements some time ago with the United States Mitis Company, as mentioned in our issue of December 10th, 1887, for the construction of a plant at its works, for the manufacture of castings by the Mitis process, made the first cast with the new furnace last week.

The Repauno Chemical Company, a Delaware corporation, filed its certificate with the Secretary of the State of Colorado, announcing a capital stock of $300,000. The object of the company is to manufacture powder, fuse, cartridges, and other explosives, and to sell and deal in the same. William C. Mathews is the agent for the company in Colorado.

The Reading Iron-Works, Reading, Pa., have effected a settlement with their employés by which the latter agree to accept 7½ per cent reduction in wages and work is to be resumed at all of the company's idle mills. The mills were shut down because of the dullness of trade. The Keystone Rolling-Mill, controlled by the same company, resumed operations on the 4th inst.

Messrs. Kelly & Jones, manufacturers of appliances required in the use of steam, water, gas and electricity, it is reported will remove their works from Jersey City to Greensburg, Pa., where they have purchased twelve acres of land. A company is to be incorporated with a capital stock of $300,000. The reason of removal is the superiority of the natural gas for fuel.

A reduction of 10 per cent was made on the 2d inst. at the Stewart Iron Company's furnaces at Sharon, Pa. This is considered the beginning of a general reduction throughout the Shenango Valley in wages. Since the acceptance of a reduction by the Mahoning Valley furnace workers, the Shenango companies have claimed that in order to compete they must have a reduction also.

Messrs. Jones & Laughlins, of the American Iron and Steel Company, Pittsburg, Pa., are laying the foundation for the erection of a 26-inch mill for the purpose of rolling billets and blooms for making steel beams and channel irons. The contract for 370 tons of steel and angle iron, for use on the south wing of the Western Penitentiary now in course of erection in Allegheny City, has been awarded to them for $16,000.

The transfer of the old Cummer (Prospect) Engine-Works, Cleveland, Ohio, has been made to the new company, known as the Kilby Manufacturing Company, with a capital of $400,000. It has purchased the plants of the Prospect Machine and Engine Co., of Cleveland, and Barney & Kilby, of Sandusky. The officers of the new company are J. W. Lee, President; Jos. T. Kilby, Vice-President and Manager, and W. S. Dodge, Secretary and Treasurer.

The Chickies Iron Company, Chickies, Pa., has increased its capital stock $50,000, the entire amount having been taken by the present stockholders. The company will at one enlarge and improve No. 2 furnace to correspond with No. 1, which was changed in 1886, and has been in successful operation ever since. The contract has been given to the I. P. Morris Company, of Philadelphia, for the blowing engine, which will be fifty per cent larger than that erected at No. 1 by the same firm.

The suit of the Babcock & Wilcox Company, of New York, against the Pioneer Iron-Works, for infringement of their patent, in building the Zell boilers, has been decided in their favor by Judge Wheeler, of the United States Circuit Court for the district of New York, and the latter company has paid $6500, in settlement for such infringement. A similar suit against the makers of the Moore boiler is now pending in the United States Circuit Court for the district of New Jersey.

The M. C. Bullock Manufacturing Co., of Chicago, Ill., manufacturers of milling and mining machinery, report the following among recent important shipments: To the Chapin Exploring Company, Tower, Minn., 1 duplex mining pump and boiler; to the Locey Coal Mine, Loceyville, Ill., 1 first motion hoisting plant; to the Central Coal Company, Springfield, Ill., 2 link motion horizontal engines, 1 wood-lagged drum, 2 coal mine cages, 2 sheaves, 1 fan and 1 engine; to W. W. Robbins, San Antonio, Texas, 1 "Crescent" diamond prospecting drill outfit, and to George M. Wakefield, Llano, Texas, 1 deep-hole "Dauntless" diamond drill outfit complete.

A meeting of the various Knights of Labor Lodges connected with the Edgar Thomson Works was held this week at Braddock, Pa. Mr. Carnegie's ultimatum to their written concession was received. It was to the effect that his first wage proposition published in our last issue, was all he could offer, and it remained with his employés to accept or decline. The unanimous decision of the lodges was to reject it. On this being made known to the officials of the works they said that the mill would be boarded up at once for the remainder of 1888. The great mass of the workmen favor accepting the sliding scale proposed by Mr. Carnegie, as it raises their wages. The few Knights of Labor who have been earning $1 per hour will not earn so much under a fair scale, and hence their refusal to work. They comprise less than 500 of the 3000 employés.

At the Otis Iron and Steel-Works, Cleveland, Ohio, electricity is called upon to take the place of hand labor in lifting steel billets, ingots, and other heavy pieces of iron. For the construction of the electro-magnet to be used for this purpose two bars of soft iron were taken, each being 14 inches long and 3 inches in diameter. They were wrapped with a multitude of strands of No. 14 B. & S. gauge covered wire. To combine the two separate magnets thus formed into one they were linked together on the top by a third soft bar, square in the cross section. For trial of the magnet at portative work it was suspended by a rope from a pneumatic crane. Rope was used, as it was found that a chain became magnetized and did not act very well. The current power sent through the wire to induce the magnetism was that of 5½ to 6 ampères. It wound that a weight of 800 pounds could be lifted up handily, and by shutting off the current and lowering the magnet deposited anywhere very easily.

Messrs. Fraser & Chalmers, of Chicago, Ill., advise us that the report in the Chicago *Tribune* about the destruction of their works was false in every particular. They write us as follows to show how the report originated: "As the *Tribune* was going to press the morning of March 30th a fire broke out in a large factory devoted to the manufacture of implements connected with the dairy product, located some three blocks from our works. This factory was entirely destroyed and made a great blaze. The loss was about $300,000. The *Tribune* had no time to send a reporter to the vicinity of the fire to make a true report, and could not imagine that any fire in our locality could be so great unless it was caused by the destruction of our works; therefore the early edition of the *Tribune*, from which the associated press takes its news, this edition devoted entirely for country circulation, was struck off before it was discovered that the fire had not touched our works."

In the later edition of the *Tribune*, which all Chicago readers had delivered, no mention was made of the destruction of the extensive works of Messrs. Fraser & Chalmers, but at the end of the article on the fire, stated that it was at first thought the fire had destroyed the works of Fraser & Chalmers. "The firm has received many telegrams from friends in reference to the fire, and for the purpose of informing the numerous patrons of this great establishment, to which many of our readers belong, we publish the above."

CONTRACTING NOTES.

Machinery and supplies wanted. See page xiv.

Contracts open will be found on pages xiii and xix. New contracts this week: No. 842, Building Sewers furnishing iron water pipe, sewer pipe, etc.; No. 843, Water-Works; No. 844, Water-Works; No. 845, Steel Rails; No. 846, Bridge; No. 847, Water-Works and Supplies; No. 848, Iron, Copper, Slate, etc., for building; No. 849, Cast Iron Water Pipe, Special Castings, etc.; No. 850, Railway Construction; No. 851, Coal; No. 852, Boilers; Nos. 853 and 854, Water Works.

The Aqueduct Commissioners of New York have decided to reject all the bids for the million-dollar pipe contract and to give a public hearing on the subject to all parties interested on the 11th inst. It appears that such a public hearing is required by law, and during the recent contest over the late bids it transpired that no such public hearing had been given. The prospect is that the new bids will be somewhat lower than the others.

GENERAL MINING NEWS.

An application has been made in the Circuit Court at Milwaukee from the receiver of Moore, Benjamin & Co., for leave to put up $27,000 of the first mortgage bonds of the Nimikon Mining Company as additional collateral for money owing to the Merchants' Exchange Bank, of Milwaukee, and Stevenson Burke and the Commercial National Bank, of Cleveland. The Milwaukee banking concern has $35,000 coming to it, for which it holds as collateral 9500 shares of Aurora stock, while Mr. Burke and the Cleveland Bank hold 7500 and 3000 shares of Aurora stock, respectively, as collateral for $75,000 and $30,000. Mr. Burke is willing to take up the indebtedness to the two banks and carry the whole for a year, if he is given $27,000 of bonds. This is done in the expectation that Aurora stock will advance, and enable the

receiver to realize a profit from its sale. It is now bringing from $3 to $6.50 per share at forced sales, while the property pays 10 per cent on the stock at the rate of $14 per share. It is said that if the stock held as collateral was now sold, the receiver couldn't pay over one half of the indebtedness.

NORTH PACIFIC BIRMINGHAM AMALGAMATION COMPANY.—We are advised that this company has been organized with a capital stock of $5,000,000. The Hon Judge W. W. Upton, of Washington, D. C., and his sons, at Walla Walla, Washington Territory, are the chief promoters of this enterprise. This company has purchased the exclusive right to the patents for the Birmingham system of electric amalgamation of gold and silver ores for Idaho, Oregon, Washington Territory and Alaska.

TENNESSEE COAL, IRON AND RAILROAD COMPANY.—Official advices to us show that during March 17,559 tons of coal and 14,582 tons of coke were received from the mines of the Tracy City division, making a total from January 1st of 51,879 tons of coal and 39,891 tons of coke.

ALABAMA.

JEFFERSON COUNTY.

The American Well Company, of Aurora, Ind., will bore for natural gas and sink several artesian wells at Bessemer.

CALIFORNIA.

MONO COUNTY.

BODIE CONSOLIDATED MINING COMPANY.—During the week ended the 26th ult., the east cross-cut from the 1200 station shows that the ground is broken up some with streaks of quartz having a little ore in them The water in the winze from the 1000 level is increasing again, so that but little headway can be made.

SOUTHERN DEVELOPMENT COMPANY.—The Supreme Court has affirmed the decision of the Circuit Court of California in the case of the Southern Development Company against Frank Silver. The latter sold the Development Company mines in Mono County. They did not pan out, and the company sued to recover the money paid Silver on the ground that he had "salted" the mines and obtained the money under false pretenses.

The Circuit Court held that it was the business of the company to have ascertained the true character of the mines before making the purchase, and the Supreme Court upholds that view of the case.

COLORADO.

COLORADO COAL AND IRON COMPANY.—At the annual meeting, held at Colorado Springs, the following were elected directors: Heman Clark, Thomas E. H Curtis, William A. Dick, Henry W. O. Edge, Walter B Lawrence, Ernest Thalmann, August Rutten, A H. Danforth and Henry E. Sprague. The total estimated earnings for the fiscal year are $627,500; earnings on investments, $138,400; net earnings over operating expenses, $ 65,900; interest payments, $278,200; sinking fund payments, $86,000; net surplus earnings over fixed charges for fiscal year ending January 31, 1888, $401,700. The estimated fixed charges—coupon interest and sinking funds—for the current fiscal year are $37,000 per month.

MARSHALL CONSOLIDATED MINING COMPANY.—This company, whose property is situated within 24 miles from Denver, is taking out on an average 50 tons of coal per day. Under the able superintendency of Mr. McNeil the mine has become a great producer, producing a little over half the total output of the county during the year 1887. And since he has had charge, says the Boulder *Sentinel*, he has opened up mine No. 5 which is 125 feet above the old mine No. 3. This vein is about 6 feet thick. In running in the tunnel another vein 3 feet and 9 inches thick was discovered. The vein, which is 30 feet lower than the one working, though not very thick, is of extra quality and will eventually be worked. In the mine No. 3, Mr. McNeil bored down 27 feet from the workings and struck a new vein of 5 feet and 7 inches in thickness He is still boring and expects to find still another vein lower.

BENT COUNTY.

LA JUNTA MINING AND COAL COMPANY—This company has been organized with a capital stock of $25,000, shares $25 each. The object of this company is to prospect for coal, gas and oil. The incorporators are R. W. Patterson, R. C. Graves, Geo. A. Kilgore, John Rainer, John W. Mapes, B. F. Haskins, A. J. Johnson and James McNein. Arrangements have been made to sink a shaft, and operations will begin at once. It is stated that experts have been called to La Junta for the purpose of examining the geological formation, and they have unanimously asserted that both coal and oil or gas can be found. There are outcroppings of coal in the vicinity of La Junta, but to what extent has not been developed. Some four years ago some parties sunk a shaft about 60 feet, and found a stratum of coal about 3 or 4 inches thick.

CUSTER COUNTY.

BASSICK.—This mine, which has been idle, owing to litigation, for about three years, has been bonded by the contending factions to Mr. John P. Grant, of London, it is said, for $300,000, and the property will likely be placed in England. The mine was sold some years ago by Mr. Bassick to a syndicate who incorporated a company with a capital stock of $10,000,000. Later difficulty arose over the management, and during the prolonged litigation which ensued debts were allowed to accumulate and a number of judgments were obtained against the property and brought up. The mine is now filled with water and it is estimated that it will require $100,000 to put it in good working order.

LAKE COUNTY.

AGASSIZ CONSOLIDATED MINING COMPANY.—An amendment to the articles of incorporation of this company has been filed with the Secretary of State. The capital stock is increased to $2,500,000, and the principal office is established at Leadville.

LAS ANIMAS COUNTY.

The coal resources of this county are being rapidly developed and the field is rapidly becoming one of the most productive in the country.

COLORADO FUEL COMPANY.—This company will put up 100 coke-ovens in the vicinity of Trinidad this season, which number they will eventually increase to 500.

PITKIN COUNTY.

BONNYBEL.—This mine continues to improve with development. Another body of ore has been uncovered between the cut and the old shaft. The mine can ship indefinitely from sixty to one hundred tons daily, and is shipping to the full capacity of its transportation facilities.

PUEBLO COUNTY.

The proposition submitted by Mr. E. R. Holden to the Board of Trade of Pueblo regarding the location of the proposed smelter to be built by Messrs. Holden & Guggenheim, to the effect that if Mr. A. H. Danforth would renew his former proposition to furnish land and the citizens would put up a bonus of $25,000 cash in addition, work on a six-stack smelter of 300 tons capacity daily would be commenced at Pueblo within one week. At a meeting of the citizens on the 29th ult., the proposition was accepted and the money was raised.

DAKOTA.

CUSTER COUNTY.

THE TIN MOUNTAIN MINING COMPANY.—Mr. H. W. Fowler, of Chicago, manager of this company, who has recently visited the property at Warren's Gulch, according to the Custer *Chronicle*, has expressed himself as being well satisfied with the result of the operations of the mill up to the present time. Further additions in the way of machinery will be forwarded upon his arrival in Chicago, whereby the reducing capacity of the plant will be greatly increased. Four additional Frue vanners will be employed in the early future. The difficulties encountered during the winter by reason of the freezing of the water used for concentrating purposes, will be obviated next winter by the introduction of steam pipes, for which purpose an additional boiler will be employed There are about 1000 tons of ore on the dump. The character of the ore now being mined is of high grade, and gives promise of the most satisfactory returns.

FLORIDA.

There are said to be large deposits of bone phosphate of lime in South Florida, showing by various assays of large quantities 61½ per cent. of phosphate of lime. These deposits are near railroad and ocean navigation, are easily mined and can be placed on the market at small cost. Mr. A. E. McClure, with a friend, has formed a partnership to erect works and commence the manufacturing of ground bone and super phosphate of lime as soon as the necessary machinery can be procured.

There is a mill now in operation at Gainsville turning out 25 tons daily, and it is soon to be enlarged to double the capacity.

An Atlanta company has bought up a large tract of land on which are similar deposits, and are commencing to work the mines on a large scale.

GEORGIA.

NORTH GEORGIA LAND COMPANY.—This company has been organized with a capital stock of $300,000 The company owns about 30,000 acres of mineral lands in North Georgia along the line of the Marietta & North Georgia Railroad in the counties of Fannin, Gilmer and Murray. Hydraulic machinery has already been bought and shipped, and operations have begun. It is stated that the placer gold yields now enough per day to pay expenses of development. This company also owns the Franziska ochre mine now being opened and developed in Pickens County.

BARTOW COUNTY.

GEORGIA ORE AND FURNACE COMPANY.—This company has been organized by O. W. Bullock, T. M. Kellogg, Mr. Meade and R. L. Spencer, of Tallapoosa, and has purchased what was formerly known as the Crow Iron Ore Bank, at Allatoona, Bartow County, for $25,000. The company will at once put in machinery for mining and a steam tramway for 1¾ miles to the Western Atlantic Road. The ore of this mine is used very extensively for fluxing purposes in rolling mills, and there is a large demand for it, and a contract has already been made with the Tallapoosa Furnace Company to furnish them a portion of the ore of this grade.

CHEROKEE COUNTY.

GEORGIA MICA AND MINERAL COMPANY.—This company is now at work developing its mica mine.

IDAHO.

Our esteemed contemporaries from the Black Hills are wildly enthusiastic at the prospect of an early division of the great Sioux reservation in Western Dakota. On March 21st the bill to effect this was passed by the Senate, and there is no reason to doubt that it will shortly become a law. It provides that six small reserves for the several Indian tribes shall be taken out of the present domain, and that the remainder shall be ceded by the Indians to the United States Government for just and sufficient considerations. This will open a vast region to western energy and enterprise. It includes almost 24,000 square miles, and is said to be rich in mineral and agricultural resources.

ALTURAS COUNTY.

ALTURAS GOLD COMPANY, LIMITED.—The directors have asked the shareholders to suspend their judgment until the officers who sailed for New York on March 8 reach the mine and have made their report upon the present sudden and remarkable falling off in the returns. Then the directors hope to be in a position to furnish the shareholders with fuller information than that to which they have at present access, and the directors assure the shareholders that no news has come within their knowledge to lead to any suspicion that the value of the property is not what it has hitherto been represented to be; nor to shake their belief that, after this temporary falling off, the returns will resume a satisfactory character.

SHOSHONE COUNTY.

ARGENTINE MINING COMPANY.—In the lower tunnel of the Argentine mine a rich and most remarkable strike was made. The Murray *Sun* says that it consists of an apparently solid shoot, or, more properly, a bulkhead of gray copper extending from the hanging to the foot-wall, a distance of eleven feet. On the foot-wall it is concentrated for a distance of four feet into a solid mass of the consistency of black lead, and so soft and pliable as to be stripped away in sheets or torn off in large blocks, leaving surfaces as smooth and polished as glass. The work of finishing the tramway is progressing rapidly, and shipments of ore will begin shortly. The erection of concentrating works is spoken of.

ILLINOIS.

ST CLAIR COUNTY.

BLOCK & HARTMANN SMELTING COMPANY.—This company, whose works are situated at Bellville, has made a practical success of its first year's operations in the treatment of copper ores. The company is now in the market to purchase copper ores and matte.

KENTUCKY.

B. P. Reed, J. S. Ray and J. D Reed, of Louisville, and others have formed a company to build a railroad from Pineville to the Big Sandy River, and from Pineville to the Tennessee State line.

MARYLAND.

ALLEGHANY COUNTY.

As a result of blasting in the cement works quarry at Cumberland, says the *News* of that place, a half dozen notable openings in the rock have been made. One of them is about 25 or 30 feet wide and the same in height and above 50 feet in depth; at the end of this a smaller passage about 8 feet high by 8 or 10 wide continues to a depth of about 75 feet, making a total depth of about 125 feet. Another opening about 6 by 10 feet has to be reached by a 20-foot ladder suspended from an iron bar driven in the rock. This one penetrates about 75 feet.

MICHIGAN.

COPPER MINES.

The output of mineral (about 80 per cent copper) of the seven leading copper mines of Lake Superior in March, is given by the Boston *Transcript* as follows:

	March.			Jan. 1 to March 31.		
Mines.	1888. Tons.	1887. Tons.	1886. Tons.	1888. Tons.	1887. Tons.	1886. Tons.
Cal & Hecla.....	2,289	2 9 7	2,700	5 9 2 1	8,105	7.66 2
Tamarack.....	644	705	220	1.885	880	594
Quincy	351	240	230	1,052	631	606
Atlantic....	257	2 0	187	725	623	574
Osceola	210	145	172	6 2 1	457	503
Franklin.....	181	201	201	529	603	609
Huron..	124	98	120	350	287	367
Total 7 mines..	4.056	4,126	3,830	11,085	11,586	10,9 5

The March products without an exception were larger than in February or in January. The product of the seven mines for the first quarter of 1888 aggregates 11,085 tons of mineral, or not far from 17,000,000 pounds of refined copper.

ALLOUEZ MINING COMPANY.—It is stated that considerable improvements are shortly to be made at the mines. The No. 1 hoisting engine house is to be pulled down and a new engine put in, the rock-house foundations rebuilt, etc.

CENTRAL MINING COMPANY.—It is said that the Wintarop property is likely to be acquired by this company. This is one of the very oldest of the defunct mines of the district, and has from the beginning received but very little attention, the local papers state that no work has been done on it for the last twenty five years.

ST. LOUIS MINING COMPANY.—Local papers state that in order to prevent an assessment on the stock, and at the same time raise money to do some exploratory work on this property, many of the larger shareholders have relinquished a quarter of their holdings, from the sale of which it is proposed to create a fund for the opening and development of the property.

TAMARACK MINING COMPANY.—The No. 2 shaft was sunk probably eighty feet in March. The company expects to receive the machinery for running the third head of stamps early in April, and the addition of this will reduce the stamping cost materially.

MISSOURI.

BATES COUNTY.

KEITH & PERRY COAL COMPANY.—The reports from Rich Hill place the total number of deaths from the explosion which occurred in the Keith & Perry Mine No. 6, on the 29th ult., at twenty-four. It is now reasonably certain that no more bodies are in the ruins, although rumors are circulated to the effect that several negroes are still entombed. The company has buried all the dead miners and will take care of the sick until they recover, and will also provide for the families of the victims until other arrangements can be made.

The coroner's inquest on the victims of the mine dis-

aster began on the 31st ult., and many witnesses have since been examined, among them State Mine Inspector Wolfe, who testified that he went through the mine about four weeks ago and it appeared to be in perfect condition then. Seven miners were also examined, but they knew nothing as to the existence of gases. Dr. Allen testified that the dead miners were all asphyxiated. None of them were burned. A dispatch on the 6th inst. states that the coroner's jury has rendered a verdict. State Inspector Wolfe was declared to be incompetent. Keith & Perry were censured for culpable negligence. The owners of the mine have engaged the best legal talent. A successor to Inspector Wolfe will be appointed by Gov. Morehouse.

MONTANA.

MADISON COUNTY.

CASTLE MOUNTAIN MINING AND SMELTING COMPANY.—This company has been organized with a capital stock of $1,000,000, shares $10 each, to work the Great Eastern mine at Castle, by Geo. F. Woolston, of New York, and M. T. & R. C. Wallace, of Helena.

SILVER BOW COUNTY.

ANACONDA COMPANY.—A frame building two hundred and sixty feet long by seventy feet wide, with a wing seventy-eight feet long by fifty-six wide, and an addition of one hundred and twenty-five feet to the tank house, are to be erected immediately at the upper smelting works of the company. The Butte *Inter-Mountain* states that the Union Pacific Railroad Company is about to open up a coal mine in Wyoming, the entire product of which will be reserved for the Anaconda Company. The coal consumed by the works now amounts to about 200 tons per day, but when the lower plant is started up the company will use 380 tons of coal daily.

NEVADA.

ELKO COUNTY.

FOUND TREASURE MINING COMPANY.—This company has begun a suit against the North Commonwealth Mining Company to quiet title to a portion of its ground.

NORTH COMMONWEALTH MINING COMPANY.—This company has brought a suit against the Found Treasure Mining Company. The District Court has appointed M. H. Black receiver, with full authority to visit any and all portions of that mine and take possession of all ore extracted. Admission, however, was denied him.

HUMBOLDT COUNTY.

ADELAIDE COPPER COMPANY.—This company has been incorporated to operate in Gold Run District, with a capital of $1,000,000, shares $10 each. The directors are: A. J. Rowlstone, A. S. Bates, Jr., W. H. H. Graves, H. N. Tilden and Luke C. Kelley.

STOREY COUNTY—COMSTOCK LODE.

CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.—Total shipments on the Marsh account to the 30th ult. foot up $235,000, and when the cleanup is made the product from the mine for that month, it is said, will exceed $400,000.

HALE & NORCROSS MINING COMPANY.—The President in his report, presented at the annual meeting held in San Francisco recently, states: "That at the last annual meeting the company had an indebtedness of $39,518.99. During the year just passed the trustees levied two assessments amounting to $112,000, which, with the product of the mine for the last three months, with the milling capacity of only fifteen stamps, served to pay off the above indebtedness, the entire cost of mining and all auxiliary work connected therewith. The Secretary's report shows receipts during the year of $287,554.54 and disbursements of $291,965.73, leaving an indebtedness of only $86,219. Joel F. Lightner was re-elected Secretary, which is the eighteenth consecutive term he has held the office. The superintendent in his reports says in reference to the ore discovery above the 700 level: "In the north lateral drift, 35 feet from the main west drift, we commenced to extract ore from the old stopes. After attaining a distance of about 40 feet above the track floor, we cut through the old east clay wall and encountered an extensive and valuable body of ore. We have extended this upraise 100 feet in this ore body. From the top of this upraise we drifted northwest 245 feet and connected with the south drift of the Savage 600 level. This drift shows the continuation of the ore body for this distance. Cross-cuts made at different points in this upraise showed a width of from 30 to 35 feet of ore. On the track floor 126 feet south of the north upraise, a south upraise has been advanced 115 feet in the same character of ore as that exposed by the north upraise. These upraises have been connected by drifts which demonstrate the continuation of the ore-body for a distance of over 300 feet. Every thing in the mine is in good working order, and we are warranted in promising stockholders payment of dividends at an early date." The following officers and directors were elected to serve the ensuing term: H. M. Levy, President; A. K. P Harmon, Vice-President; Joseph Marks, Marris Hosflich, C. P. Eagan, and C. L. Wheeler. The control of the property remains in the same hands as prior to the election. The bullion shipments in March amounted to $160,000

KEYES SILVER MINING COMPANY.—Colonel S. T. Curtis has taken charge of the Keyes mine, to the superintendency of which he was appointed by the new management. It is stated that Mr. Frank Shay, the newly-elected president of the company, has become heavily interested in the property, and explorations will be vigorously prosecuted. Ex-Governor Perkins, of California, and Millett Griffith are also stockholders in the mine.

POTOSI MINING COMPANY.—The statement presented at the annual meeting recently held shows that three assessments were collected during the year, amounting to $145,600. There was also $15,277 received from sales of bullion, leaving 6541 ounces fine bars unsold. The disbursements for the year (including an overdraft of $9274 carried over from the previous year) were $209,213. An overdraft of $43,557 was reported on February 29th, 1888. The superintendent in his report calls attention to work done on the 120, 350, 450, 930, and 1300 levels. Some $20 ore was discovered from workings in the 350 level, but the width was only 45 feet. He makes no promises of dividends or ore bodies in sight. The old officers were re-elected.

NEW HAMPSHIRE.

CHESHIRE COUNTY.

The old black lead or plumbago mine at Nelson has been bought by the Minnesota Plumbago Company, of Minnesota, which will develop and work it. It has been profitably worked on a small scale in the past. The company is capitalized at $1,000,000.

NEW MEXICO.

The appraisers of the stocks of the estate of the late Jerome B. Chaffee valued 4800 shares in the capital stock of the New Mexico Mining Company at $75,000; and 960 shares of the capital stock of the Cerrillos Coal and Iron Company, at $5000.

BERNALILLO COUNTY.

SAN PEDRO.—This copper mine, located near Albuquerque, has been leased for two years by Mr. W. A. Clarke, of Butte, Montana.

OHIO.

LORAIN COUNTY.

At the quarries of Messrs. H. E. Mussey & Co. at Elyra, they are now working their rock 80 feet deep and have not found the bottom, the entire mass being referred to as the genuine grindstone grit. They intend working this season with increased force and all the latest improved machinery and greatly increase the production. The quarries are located at the junction of two divisions of the L. S. & M. S. R.R. and also the C., L. & W. R.R., and are connected with these railroads, having switches running into and through the quarries, so that they can load directly on to the cars.

PENNSYLVANIA.

The large slate property of the Dawborn estate has been bought by Clinton Blair, son of John I. Blair, of Blairstown, N. J., for $207,000. The tract embraces several fine quarries. The purchasers will, it is said, put $50,000 more into this property for the purpose of manufacuring roofing slate.

COAL.

The report of the Schuylkill Coal Exchange, Pottsville shows that the following collieries drawn to return prices of coal sold in March, 1888, to determine rate of wages to be paid, make the following returns: Mahanoy City Colliery (P. & R. C. & I. Co.), $2.452; North Ashland Colliery (P. & R. C. & I. Co.), $2.434; Beechwood Colliery (P. & R. C. & I. Co.), $2.585; Lawrence Colliery (Lawrence & Brown), $2.68; Wm. Penn Colliery (Wm. Penn Coal Co.), $2.52. The average of these prices is $2.535, and the rate of wages to be paid is one per cent above the $2.50 basis.

DELAWARE & HUDSON CANAL COMPANY.—The Marvine shaft of this company at Scranton was flooded on the 3d inst. by water from an abandoned gangway in the Richmond mine adjoining. The flood penetrated the deeper workings of Marvine shaft, and the men and boys barely escaped with their lives. A number of mules were drowned. A cave-in was caused on the surface.

Navigation opened on the 2d inst. on the canal—nine days earlier than last year, when the season was unusually backward. The indications are that the canal will do a larger coal-carrying trade this year than ever before in its history. The fleet of boats employed on the canal last season numbered about 550, to which will now be added about 50 new boats that have been built during the winter at Rondout and Honesdale, together with the 98 "free boats" that were withdrawn from service in 1886. The shipments of coal last year from Honesdale aggregated 873,000 tons. The company opens the present season with over 300,000 tons piled there awaiting shipment. The rates to be paid by the company to its boatmen will be the same as last year, and, taking the early opening and other circumstances into consideration, the men look forward to an unusually prosperous season.

LEHIGH COAL AND NAVIGATION COMPANY.—A line is being surveyed from Phillipsburg to Belvidere by this company, with the intention of connecting the Lehigh & Susquehanna Railroad with the Lehigh and Hudson River road, thus giving the Lehigh Coal and Navigation Company direct rail connection with the New England States by Poughkeepsie Bridge. The Lehigh & Hudson starts at Belvidere and ends at Greycourt, whence it will connect with lines crossing the Hudson.

RIDGEVIEW COAL AND COKE COMPANY.—This company has decided not to rebuild its works near Latrobe, recently destroyed by fire, as mentioned in our issue of March 24th, as the recent fire was the second one. The mules and all other belongings are offered for sale.

OIL

Exports of refined, crude, and naphtha from the following ports, from January 1st to March 31st.

	1888. Gallons	1887. Gallons.
From Boston	4 5,536	1,188,420
Philadelphia	25.947 757	30.951,905
Baltimore	965 514	1,894,689
Perth Amboy	3,584.080	3,365,516
New York	84.017.188	84,114,237
Total exports	114,930,075	120,814,767

SOUTH AMERICA.

REPUBLIC OF COLOMBIA.

Our special correspondent sends us the following: Messrs. E. E. Olcott, M.E., and Robert Peele, Jr., have concluded their examination of El Talento and left Honda on March 1st for the State of Antioquia, where they will make an examination of the Colonias group of mines, in which some New York capitalists are interested. Thence they go home, reaching there early in April. Of course they give no positive indications of what their report will be upon Talento, but, judging from the few straws found along the by-ways, it will be a favorable one. Mr. Olcott has seen a number of other properties in the State of Tolma, and, it is said, he has taken quite an active interest in some. At all events, he leaves here promising every one to return quite soon.

The disputed boundary line between El Cristo and La Escocia mines has been mutually agreed upon by officials of both properties. This settlement definitely fixes the Escocia line within 300 feet of the Cristo main shaft on the vein. Work was immediately begun on Escocia.

The Mal Paso gravel mine produced over $20,000 gold in January at less than 10 per cent expense. The production for February will be somewhat less, possibly 20 per cent.

The Oritá gravel mine promises to soon equal the production of Mal Paso.

There is a strongly corroborated report of Cristo having cut another 6-foot vein at 186 feet deep, which is claimed as very rich. Whatever may be the development the superintendent has thought it wise to conceal the strike by planking and ceasing work in that part of the mine.

Dr. Magin, of Cali, in State of Cauca, feels greatly elated over the developments of his mine. He claims that it exceeds his expectations. He expects to reach New York in April.

John C. F. Randolph is still at La Plata mine in the south of Tolima. The shares of this mine are held in Bogotá at $1600 each. There are 500 shares in the corporation, which is native. Much interest is expressed for the result of Mr. Randolph's work.

There is getting to be quite a boom in Bogotá among the natives for mining shares in properties in the State of Tolima. La Selvita is the name of a little gold mine located near Ibaguè, which has just been put upon the Bogotá market at $10 per share—2000 shares—and the shares sell quickly. Colombians are evincing some anxiety regarding the acquisition of mines by foreigners. Unquestionably there is a boom coming for Tolima in America, and England, too.

The Frias mine, near Honda, is now looking better than it has for the past six or seven years, the ore in three faces growing in richness daily. Another "bonanza" output is promised soon for this mine.

La Santa Maria mine, near Frias, has just started its new mill concentrating, and now will add its name to the list of mineral-exporting mines.

Reports from Boconème mine continue to get better and better.

Mr. J. A. Prout, representing a New York syndicate, has just bonded a valuable piece of gravel lying immediately north of Mal Paso and Oritá mines. Surely the New York syndicate are to be congratulated upon his lucky find, for there were several persons making a still hunt for this same ground.

TENNESSEE.

CUMBERLAND COUNTY.

William J. Whittborne has, it is stated, about closed the sale of 164,000 acres of coal lands in Cumberland county to Chicago parties, who will, it is said, build a railroad, open mines, erect coke-ovens, etc.

TEXAS.

According to reports the Kansas City Smelting Company, of Kansas City, Mo., has made a proposition to build smelting works at San Antonia, with a capacity of 100 tons daily. It will be accepted.

WASHINGTON COUNTY.

Natural gas has been struck at a point seven miles west of Bremen at a depth of 55 feet. The pressure is light.

UTAH.

SUMMIT COUNTY.

LUCKY BILL MINING COMPANY.—This company has been organized with a capital stock of $300,000, shares at $2.50 each. The officers are John H. Rogers, President; E. P. Hatch, Treasurer, and A. C. Hammond, Secretary. Among the properties owned by this corporation is the Lucky Bill, Homestead, the Safe Guard and the Cliff. One third of the capital stock is set aside for working purposes. The principal office will be at Park City.

WEST VIRGINIA.

MONONGALIA COUNTY.

A new coal field has been discovered near Maidsville, one mile from the Monongahela River. A company is being formed to build a tramway to the river and develop a tract of 64,000 acres of coal. It is stated that the field lies in a line with the Pennsylvania oil belt and three wells are being put down.

WISCONSIN.

GOGEBIC DISTRICT.

JUPITER DEVELOPMENT AND MINING COMPANY.—This company is a reorganization of the Jupiter Iron Mining Company. The object of the reorganization being merely, it is said, to correct the defects of the old corporation so that work can be prosecuted continuously and vigorously on the property. The report of the treasurer of the Jupiter Iron Mining Company, presented to the directors on the 30th inst., showed a cash balance of $17.75, and about $100 of unpaid bills. There is about $1000 due the company which will be paid within 30 days.

MOORE.—It is reported that this mine, west of Hur

ley, has been bonded for $40,000 to raise funds to work the mine. It has never shipped any ore.

PURITAN MINING COMPANY.—It has been decided to sell the leasehold, machinery, implements and all the property, real and personal, and all rights and privileges of every kind of this company to the highest bidder, and for cash on the 26th inst., at No. 101 St. Clair street, Cleveland, Ohio.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, April 6.

Statistics.

Production Anthracite Coal for week ended March 31st, and year from January 1st:

TONS OF 2240 LBS.	1888. Week.	1888. Year.	1887. Year.
P. & Read. RR. Co.	158.004	1,454,571	1,762,215
Cent. R. R. of N. J.	108,730	1,119,490	1,054,923
L. V. RR. Co.	154,770	1,726,813	1,658,312
D., L. & W. RR. Co.	158,610	1,713,654	1,332,760
D. & H. Canal Co.	114,168	1,141,413	1,048,521
Penna. RR.	63,340	847,267	751,757
Penna. Coal Co.	20 892	257,819	330.729
Total	778,514	8,361,017	7,939,217
Increase	131,994	421 800	
Decrease			

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Production for corresponding period:

1883 ..... 6,774,357 | 1885 5,667,937
1884 ..... 6,128,591 | 1886 7,631,567

Production Bituminous Coal for week ended March 31st, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.

EASTERN AND NORTHERN SHIPMENTS.

	1888. Week.	1888. Year.	1887. Year.
Phila. & Erie RR.	5,700	16,841	.....
*Cumberland, Md.	†	730.570	932,1 0
Barclay, Pa.	†	44.882	62,311
Broad Top, Pa.			
H. & Broad Top. RR.	6.824	112,240	115,117
Clearfield Region, Pa.			
Snow Shoe	2.014	38.963	47,534
Karthaus (Keating).	3.731	55.829	52,037
Tyrone & Clearfield.	80,792	896,468	769,432
Tipton	519	12,068	.....
Allegheny Region, Pa.			
Gallitzin & Mountain	16,914	245,553	206,597
Pocahontas Flat Top Coal.			
Norf'k & West. RR.	29.899	392,724	277,971
Kanawha Region, W. Va.			
Ches. & Ohio RR.	†	455,100	358,211
Total	147,293	3,001.228	3,521,330

* Tons of 2240 lbs † Report not received.

WESTERN SHIPMENTS.

Pittsburg Region, Pa.			
West Penn RR.	6 04	101,419	83,933
Southwest Penn. RR.	2.580	29.075	41,309
Pennsylvania RR.	6,932	74,419	58,745
Westmoreland Region, Pa.			
Pennsylvania RR.	48 971	420,068	333,007
Monongahela Region, Pa.			
Pennsylvania RR.	5,548	79,028	91,849
Total	70,235	704,009	671,893
Grand total	217,528	3,705,237	3,193,223

Production of Coke on line of Pennsylvania RR, for week ending March 31 st, and year from January 1st, in tons of 2,000 pounds: Week, 76,593 tons; year, 973,574 tons; to corresponding date in 1887, 1,120 403 tons.

Anthracite.

No new or important features have developed in the trade during the week under review. Pretty much the same condition of affairs continues—a dull market, with no stimulating influences immediately in sight. From what we learn, there is more than a fair chance of the companies pulling together this year, certain semi-official information seeming to indicate that the disturbing factor referred to in our last review will be eliminated. Patience must be exercised, however, and the product held well in hand, so that no undue quantity be thrown upon the market until it shows stronger absorbent qualities.

In this connection certain things should be remembered. At the corresponding period last year the trade was just recovering from the panic caused by the strike at the shipping wharves. Yards were bare of coal and manufacturers ruoning from hand to mouth. Hence there was an activity in the market in filling up depletions, which made the task of disposing of the April allotment of 2,786,796 tons comparatively easy. The effects of that scare no longer exist, and the last strike did not have any very appreciable scare effect after the wonders of Wyoming materialized. To-day the facts are more nearly these. Apathy on the part of buyers, both local and Eastern. Many heavy buyers still have on hand considerable high-priced coal which they desire to move before taking on new stock. The usual inactivity of the trade at this period. The undertone of apprehension in the minds of many buyers as to the staying power of the present "understanding" between the managers, which is fondly nourished by our contemporaries of the daily press, who, we know, are all skilled coal operators and railroad managers, hence their dreaded lash. The duty of the hour seems to be to hold the market firmly in hand for the next month or two, by which time the public will have become familiar with the fact of its *being held*, and the work for the balance of the year should be plain sailing. There is no reason why we should not have a good year and the probabilities are that we will.

Bituminous.

There is absolutely nothing new in this market. So far as we know no contracts are being closed at less than regular prices. Prices remain the same as heretofore, namely: Free on board at Philadelphia, Norfolk, Newport News, Baltimore and Georgetown, $2.60 per ton of 2240 pounds. Free on board at South Amboy, Perth Amboy, Elizabethport, Port Johnson, Weehawken, Hoboken and Port Liberty, for shipment to points on the North River south of Fifty-seventh street, and to points on the East River west of Hell Gate, $3.25 per ton. Delivered alongside in New York harbor south of Fifty-seventh street, North River, and on the East River west of Hell Gate, $3.50 per ton; and $3.15 f.o.b. to ports in the East.

Boston. April 5.

[From our Special Correspondent.]

The coal market, so far as anthracite is concerned, has got so far back into the old condition of things that individual operators are crowding the market just about as much as they usually do at this period of the year. They are anxious to ship, and hence the market tends downward. The companies hold quite firmly to prices heretofore announced, and give it out that they expect to maintain them. Of course, there must be restriction of output of a very decided and united character if this is to be done, and it is therefore fair to state that the companies promise speedy restriction. While, therefore, the market is in buyers' favor, there is quite a strong undertone. There is no large buying from retailers in this market, and will not be for some weeks, so that Boston trade will be able to see whether the companies will work effectively together or not.

In bituminous coal circles there is only a moderate movement. The price remains nominally as last quoted, namely, $2.60 f.o.b. at all ports. It continues to grow more and more evident, however, that enterprising contractors see this figure and go it considerably better; that is to say, better for the buyer. The Boston & Maine is said to have bought all of its rail coal which it uses on its roads in Northern New Hampshire and Vermont as acquired under the lease of the Boston & Lowell. About 60,000 tons is required there. The Grand Trunk have bought their water freight coal, 40,000 tons, deliverable at Portland. It is rumored that the Old Colony have bought a part of their coal.

Vessels have been rather scarce, but freights have remained low. Of the three lines running barges to this port, all have made large contracts to run for the season and are reported as having taken all such business they desire this year, leaving a portion of their tonnage unengaged for open rates.

We quote, exclusive of discharging: New York, 70@80c.; Philadelphia, 90c.@$1.00; Baltimore, $1.05@$1.10; Newport News and Norfolk, 90c.@$1.05; Richmond, $1.15@$1.25.

There is a small movement at retail. Dealers are working their stocks down and borrow rather than buy. We quote delivered prices, 2000 pounds to the ton, as follows:

Stove, $6.75; Egg, $6.50; Broken, $6.25; Franklin, $8.00; Lehigh Egg, $6.75; Broken, $6.50; Bituminous coal, on the wharf, $4.50.

Buffalo. April 5.

[From our Special Correspondent.]

Our local anthracite coal dealers say now that there will be no change in quotations until May 1st, that being the date fixed for the season's opening rates, and the same date as last year. Bituminous coal can be bought at low figures, as there is a very large supply on hand on all the side tracks of the various railroads centering here. Our city has been visited for some days by many wholesale dealers in coal from Chicago, Milwaukee and other Western points. The presumption is that they were making arrangements and contracts for the coming season.

Nothing done in lake freights yet as all is uncertainty; vessel men and shippers wide apart in their views—the former take the situation very philosophically, and the latter say that there is no hurry as there is plenty of time before navigation opens to arrange a satisfactory tariff.

Advices from the Straits of Mackinaw do not indicate an early opening of navigation at that important point. The severe March weather dissipated the earlier hopes of prognosticators. May 1st to 10th are the dates now stated for resumption of traffic between Lakes Huron and Michigan, for the reason that the smooth ice in the Straits is three feet thick and the piled ice, which covers the ice from Mackinaw to Wangoshance is from five to twenty-five feet high.

The Tifft farm improvements are rapidly approaching completion, and a coal shipping trestle with a transfer capacity of 6000 tons per day will be ready for business by June. It is built near the immense stocking trestle, which is 1200 feet long and contains 66 pockets, operated by gravity, the entire structure being on the principle of an inclined plane.

Messrs. A. J. Hoole & Co. of this city have made and are still making extensive improvements upon their anthracite coal property in Lackawanna Co., Pa., and have in consequence enlarged the output of their mines very considerably.

Navigation is open at Toledo, Cleveland and Detroit; also at Saginaw; other ports to be heard from.

It is said that several charters have been made at Cleveland for coal to Lake Superior (Duluth and Superior) ports at 75c. per net ton.

Reports are circulated that the Brady's Bend Mining Company have 100,000 tons of the bituminous coal contract of the Grand Trunk Railway of Canada, and that the Erie quota will be reduced so much.

Awaiting developments with regard to railroad freights for the coming season is the position many dealers are in; this uncertainty will be removed before many days elapse.

Pittsburg. April 5.

[From our Special Correspondent.]

The coal market is steady, with a fair demand. The Ohio River remains in good boating order. Coal is being shipped to the lower markets as fast as it can be mined and loaded. The March exports by water were as follows: To Cincinnati, 5,830,000 bushels; Louisville, 8,962,000; total, 14,792,000 bushels. Prices in the lower markets are down to a low figure.

PRICE OF COAL PER 100 BUSHELS = 7600 LBS.

First pool	$4.75	Fourth pool	$3.25
Second pool	4.25	Railroad coal	5.00
Third pool	3.75		

The prices of Connellsville coke are very uncertain, and have no fixed value. There are a large number of idle ovens, with a fair prospect that the number will be increased, unless dealers come to a better understanding among themselves. Nominal rates: Blast-furnace, $1.25 f.o.b. cars at ovens; Foundry, $1.50.

Freights to Pittsburg, 84c.: Mahoney and Shenango Valleys, $1.57; to Cleveland, $2.10; to Chicago, $3.15. Rates to other points at same proportion.

FREIGHTS.

Freight on Coke to the West.—The Pittsburg Freight Committee, at a meeting on the 2d inst., fixed a through rate on coke to Peoria from Connellsville at $3.67, and to St. Louis proper at $3.82.

The latest actual charters to April 5th, per ton of 2240 pounds:

From Philadelphia to:—Boston, 1.05*; East Cambridge, 1.05*; Georgetown, D. C., 85; Lynn, 1.25*; New York, 90†; Norfolk, 65; Quincy Point, Mass., 1.05*; Richmond, Va., 70; Salem, Mass., 1.05*; Savannah, 90; Washington, 85.

From Baltimore to:—Bath, 1.10@1 20; Boston, 1.05; Bridgeport, Conn., 1.00; Brooklyn, .90; Charleston, .80@1.00; Fall River, .85@.95; Galveston, 3.15@3 25; New Bedford, .90; New Haven, .90@1.00; Newburyport, 1.30; New York, .90; New London, .90@1 00; Portland, 1.05; Portsmouth, N. H., 1.10@1.15; Providence, .90@.95; Savannah, .90@1 00; Williamsourg, N. Y., .90@1.00; Wilmington, N. C., 1.00.

From New York to:—Boston, .75*; ridgeport, Conn., .55; Chelsea, .80*; Com. Pt., Mass., .80*; E. Boston, .80*; E. Cambridge, .80*3c.; Fall River, .75; New Bedford, .85; New Haven, .55; Newport, .75; Portsmouth, N. H., .90*; Providence, .75.

* And discharging. 3c. per bridge extra. † A'ongside.

MARKETS.

NEW YORK, Friday Evening, April 6.

Prices of Silver per ounce troy.

Mar.	Sterling exchange	Lond'n Pence.	N. Y. Cents	Apl.	Sterling exchange	Lond'n Pence.	N. Y. Cts.
31	4.87	43	83⅜	4	4.87	42¾	93
Apl.							
2	4.87	42⅞	93¼	5	4.87	42⅝	92¾
3	4.87	42⅞	93½	6	4.87	42⅝	92⅞

Silver market continues to show a downward tendency, owing to the free offerings of the India Council.

Foreign Bank Statements.—The governors of the bank of England at their weekly meeting made no change in its rate for discount, which remains at 2 per cent. The bank lost £1,063,319 in the week, and the proportion of reserve to liabilities was reduced from 37·69 to 36.06 per cent, against a decline from 48 57 to 45.51 per cent at the same date last year, when the rate for discount was 3 per cent. The loss of reserve is incidental to the spring distribution of dividends. The weekly statement of the Bank of France showed decreases of 1,750,000 francs in gold and 375,000 francs in silver.

The New York Metal Exchange at its annual election has elected the following officers: President, Tallmadge Delafield; Vice-President, Wm. H. Davol; Treasurer, Carl Mayer; Secretary, Edward J. Sbriver.

Copper.—Owing to a combination of causes, including the Easter holidays in Europe, the continuance of the strikes on the railroads in the West, the great depression on the Stock Exchange and the falling due of the Metal Exchange contracts on the 1st of this month, business was very quiet in the copper market during the early part of this week, but in spite of all these unfavorable influences the firm and confident feeling which we have reported for some weeks past has been as conspicuous as ever, and during the last few days this sanguine feeling has resulted in very large transactions and an advance in prices, which gives every promise of further progress in the immediate future. The settlements becoming due at the beginning of this month passed over very quietly, and it was quite evident that the quantity of Lake copper now held by speculators has been very greatly reduced. Export orders for Europe, which to some extent have been suspended during the recent holidays, are now coming to hand again in a very satisfactory manner, and these orders naturally tend to assist the advance in prices. The business done during the week amounts to a total of about two and a half million pounds, and the price for Lake left off last week at 16c. for spot, while to-day the market closes very strong at 16 50c. for spot, and 16·55c. April, 16·70c. May, 16·70c. June, 16·70c. July.

The transactions would no doubt have amounted to a much larger total had it not been for the sudden rise in values. Considering the continued very heavy exports (which appear certain to continue throughout the present month at the least), it seems very likely that the stocks of fine copper will be reduced to such an extent that we should not be surprised to see higher prices still before long.

The scarcity in outside brands has been more marked than ever, and at the time that Lake copper was being done at 16c., 15¾c. was bid for Arizona

copper, without finding sellers. Casting copper is now held for 15½@15¾c.

The Calumet & Hecla Company is reported to intend reopening their mine during the next few days; but of course it will be impossible to hoist any thing for some considerable time, and it must first be ascertained what is the extent of the damage underground by the fire. In the meantime, however, the operations at the South Hecla mine have been pushed forward with extraordinary vigor, and the production during the last month amounted to about 2200 tons of mineral of about 80 per cent. It is rumored that the Calumet & Hecla Company are likely to make a sale to consumers shortly.

In London, the market for Chili bars continues very steady at £80 5s. to £80 7s. 6d. for spot, and £79 10s. to £79 15s. for three months forward, and the fluctuations during the week are very insignificant.

The exports of copper from January 1st, 1888, to date, were as follows:

	Copper matte. Pounds.	Copper. Pounds.
To Liverpool	18,056,260	9 990,172
" London		6 507,306
" Havre		6,205,3 6
" Bordeaux		694,0 6
" Rotterdam	45,000	405,349
" Antwerp		4 6 485
" Hamburg		229,559
" Leghorn		1.789,769
Total	18,101,260	26,248,026

The exports of copper from New York during the week were as follows:

To Liverpool—	Copper matte.	Lbs.	
By S. S. Arabic	Casks	4 8 0	$2a,0 0
" Arabic	Casks	112	117.597
" Germanic	Casks	196	211.362
" "	Sacks	2,054	2 2.5 2
" Bavaria	Sacks	616	72,280
" Spain	Sacks	3,604	420.200
To Have —			
By S. S. La Bretagne	Pigs	293	99.6 2
" La Bretagne	Casks	103	135.000
To Liverpool—	Copper.	Lbs	
By S. S. Spain	Bars	286	24,961
" Arabic	Cas s	55	68.750
" Ohio	Pigs	22	8,912
" Wyoming	Casks	164	196,8 0
" Germanic	Casks	196	243,750
To Antwerp—			
By S. S. Zealand	Pigs	732	245,409
To Hamburg—			
By S. S. Weiland	Casks	10	12,500
" Moravia	Pigs	49	112,0 0
To Hamburg old copper in transit—			
By S. S. Weiland	Pkgs	24	30 802
" Weiland	Pkgs	7	6,080
To Newcastle—			
By S. S. Oranto	Cases	27	3 145

To Liverpool	Copper matte. Lbs.	
By S. S. Arabic	Casks 4 8 0	$2a,0 0
" Arabic	Casks 112	117.597
" Germanic	Casks 196	211.362
" "	Sacks 2,054	2 2.5 2
" Bavaria	Sacks 616	72,280
" Spain	Sacks 3,604	420.200
To Have —		
By S. S. La Bretagne	Pigs 293	99.6 2
" La Bretagne	Casks 103	135.000
To Liverpool—	Copper. Lbs	
By S. S. Spain	Bars 286	24,961
" Arabic	Cas s 55	68.750
" Ohio	Pigs 22	8,912
" Wyoming	Casks 164	196,8 0
" Germanic	Casks 196	243,750
To Antwerp—		
By S. S. Zealand	Pigs 732	245,409
To Hamburg—		
By S. S. Weiland	Casks 10	12,500
" Moravia	Pigs 49	112,0 0
To Hamburg old copper in transit—		
By S. S. Weiland	Pkgs 24	30 802
" Weiland	Pkgs 7	6,080
To Newcastle—		
By S. S. Oranto	Cases

WEEKLY REGISTER OF

CURRENT QUOTATIONS.

CHEMICALS.

Acid—Acetic.....2⅝@2½
Muriatic, 18°, per 100 lbs.....1 20
Muriatic, 20°, per 100 lbs.....1 35@1 50
Nitric, 36°, per 1 0 lbs.....4.50@5.00
Nitric, 42°, per 100 lbs.....6.00
Oxalic.....7 @7½
Sulphuric, 60°, per 100 lbs.....90
Sulphuric, 66°, per 100 lbs.....1.10
Alkali—36 p. c.....1.10@1.15
48 p. c.....1.22½@1 25
Refined, 58°.....1.15
Alum—Lump, per lb.....1¾
Ground, per lb.....2
Lump per ton, Liverpool.....£5
Sulphate of Alumina.....£3 15
Aqua Ammonia—18°, ₱ lb.....4
20°, ₱ lb.....5
22°, ₱ lb.....6¾
26°, ₱ lb.....9¾
Ammonia—Sul., per 100 lbs. 3.00@3.50
Carb., per lb.....7¾
Muriate, per lb.....7
Arsenic—White, powdered, ₱ lb..3@3¼
White, glass.....
Red, per lb.....6½
White, at Plymouth, per ton..£10 7 6
Asbestos—American, p. ton.....20 00
Italian, p. ton, c. i. f. L'pool...£18 0 0
Asphaltum—P. ton.....13.00
Prime Cuban, ₱ lb.....5@6c.
Hard, ₱ ton.....$ 8.00
Trinidad, refined, ₱ ton.....$30.00
Barytes—sulph., Am. prime white16.00
sulph., foreign, floated, p. ton....19.00
Sulph., off color, p. ton.....12.50
Carb., lump, f.o.b. L'pool, ton...£3 0 0
No. 1, casks, Runcorn "...£4 10 10
No. 2, bags Runcorn " " 3 15 0
Bleach—Over 35 p.c., ₱ lb.1.82½@1.95
Borax—Per lb.....6¼
Refined at Liverpool, per ton..£28 10
Brimstone—*See Sulphur.*
Bromine—Per lb.....36
Cement—Rosendale, per bbl.....1.00
Portland, American, per bbl.....2 00
Portland, foreign, per bbl.....2 25
Chalk—Per ton.....3.00
Precipitated, per lb.....4
China Clay—English, per ton....18.50
Southern, per ton.....13.50
Chrome Yellow—Per lb.....8
Cobalt—Oxide, per lb.....2.15
Copper—Sulph. English Wks, ton£24
Precip., Eng. Wks, unit...fluctuating
Copperas—Common, per 100 lbs.$ 70
Best, per 100 lbs.....1.20
Liverpool, per ton, in casks, £1 16 1.20
Cream of Tartar—Am. 99%....32@32¾
Powdered, 99 p. c.....3½
Emery—Grain, per lb.....4
Flour, per lb.....2½
Feldspar—Ground, per ton....14.00
Fuller's Earth—Lump, per bbl.....95
Powdered, per lb.....2
Gypsum—Calcined, per bbl.....1.25
Iodine—Resublimed.....3.50
Kainit—Per ton.....11.50
Kaolin—*See China Clay.*
Lead—Red, per lb.....6
White, American, in oil, per lb.....6½
White, English, per lb.....7½
Acetate, or sugar of.....13@13½
Litharge—Powdered, per lb.....6@6¼
English flake, per lb.....9
Magnesite—Grecian, per ton.....15.00
Manganese—lump, c. i. f. Liverpool, per ton.....£3 0 6
Per unit, up or down.....1s. 6d.
Ground.....£5 10
Mercuric Chloride—(*Corrosive sublimate*) per lb.....55
Mineral Wool—Per lb.....2
Mica—
In sheets according to size, 1st quality, ₱ lb.....25@$6 00
Phosphate Rock—S. Carolina, per ton f. o. b. Charleston.....5.80
Ground, f. o. b. New York..9.00@ 9.50
Canadian Apatite, lump, f. o. b. at shipping port, per unit.....24
Phosphorus—Per lb.....70
Plumbago—Ceylon, per lb....4@5
American, per lb.....5@7
London, per cwt.....£0 15 0
Potassium—Cyanide, per lb..39@41
Bromide, per lb.....37
Chlorate, per lb.....15¼@15½
Carb. per lb.....5
Caustic, per lb.....7¼
Iodide.....2.70@2.75
Muriate, per 100 lbs.....1.77½@1.80
Nitrate, refined, per lb.....6
Bichromate, per lb.....10½
Sulphate, per 100 lbs.....1.10
Yellow Prussiate, per lb.....19
Red Prussiate, per lb.....42
Pumice Stone—Select lumps, lb. 3@5
Original casks, per lb.....1¾
Powdered, pure, per lb.....2
Pyrites—Non-cupreous, p. unit, s. 10
Quartz—Ground, per ton.....18.00
Rotten Stone—Powdered, per lb. 8½
Lump, per lb.....5
Eng., powdered, per ton.....£4
Lump, per ton.....£5
Salt—Liverpool, ground, per bbl. 70
Turk's Island, per bbl.....25
Salt Cake—Per 100 lbs.....50
Saltpeter—Crude, per lb.....4½
Refined, per lb.....6
Soda Ash—Carb., 48 ₱ 100 lb...1.25 @1.35
Caustic, 48 ₱.....1.27½@1.30
Bicarbonate.....1.12½@1.15
Soda Caustic, 60%.....2 50@2.62½
" " 70%.....2.27
" " 74-76%.....2 22½
Sal. English, per 100 lbs.....1.05@1 10
Sal. American, per 100 lbs.....1.15
Nitrate per 100 lbs.....2.25
Strontium—Nitrate per lb.....10½
Sulphur—Roll, per lb.....1½
Flour, per lb.....1¾
Crude Brimstone, 2s., per ton..20 50
Crude Brimstone, thirds, per ton 19.00
Talc—Ground French, per lb..1¼
Domestic, per lb.....6
Domestic, per ton.....15 00
C. f. Liverpool, per ton.....£4 5 0
Tannin—Pure, per lb.....
Vermilion—American, per lb...50
English, per lb.....65
Vitriol—(Blue), Ordinary, per lb..5
Extra per lb.....5¼
Zinc Oxide—Am., Dry, per lb....4½
Antwerp, Red Seal, per lb.....6@6½
Paris, Red Seal, per lb.....6½@7

* Spot.

BUILDING MATERIAL.

Bricks—Pale, per 1,000.....5.00
Jerseys, per 1,000.....7.50
Haverstraw, per 1,000.....8.50
Front bricks, per 1,000, from.....10.00
Building Stone—Amherst freestone, per cu. ft., from.....75
Brownstone, per cu. ft., from.....1.00
Granite, rough, per cu. ft., from..45
Slate—Purple and green roofing, per 100 ft.....6 00
Red roofing, per 100 sq. ft.....15.00
Black, roofing, per 100 sq. ft.....5 00

THE RARER METALS.

Aluminum—(Metallic), per lb...11.00
Arsenic—Metallic, per lb.....32
Barium—(Metallic), per lb.....975.00
Bismuth—(Metallic), per lb.....2.40
Cadmium—(Metallic), per lb.....1 45
Calcium—(Metallic), per oz.....150.00
Cæsium—(Metallic).....
Cerium—(Metallic) per oz.....160.00
Chromium—(Metallic), per lb...200 00
Cobalt—(Metallic), per lb.....6 00
Didymium—(Metallic), per oz..160 00
Erbium—(Metallic), per oz.....140.00
Gallium—(Metallic), per oz.....3250.00
Glucinum—(Metallic).....4.50
Indium—(Metallic), per oz.....158.00
Iridium—(Metallic), per lb.....700.00
Lanthanum—(Metallic), per oz.175.00
Lithium—(Metallic), per oz.....160.00
Magnesium—Per lb.....4.50
Manganese—Metallic, per lb...1.10
Mercury—*See Quicksilver.*
Molybdenum—(Metallic) per oz. 6.00
Nickel—(Metallic), per lb.....65
Niobium—(Metallic), per oz.....128.00
Osmium—(Metallic), per lb.....640.00
Palladium—(Metallic), per lb..512.00
Platinum—(Metallic), per lb....128.00
Potassium—Metallic, per oz.....2.00
Rhodium—(Metallic), per lb...512 00
Ruthenium—(Metallic), per oz.112 00
Rubidium—(Metallic), per oz...200.00
Selenium—(Metallic), per oz.....3.00
Sodium—(Metallic) per lb.....4.50
Strontium—(Metallic), per oz..128 00
Tantalium—(Metallic) per oz...144.00
Tellurium—(Metallic) per oz.....9 00
Thallium—(Metallic) per oz.....3.00
Titanium—(Metallic) per oz.....32.00
Thorium—(Metallic) per oz.....272.00
Tungsten—(Metallic) per oz.....4.00
Vanadium—(Metallic), per oz..320.00
Yttrium—(Metallic), per oz.....144.00
Zirconium—(Metallic), per oz..240.00

METALS.

Aluminum—
Bronze (10%), ₱ lb.....46c.
Copper—
Lake Ingot, Spot, ₱ lb...16·50@16·65c.
Electrolytic, ₱ lb.....16c
Casting Brands, ₱ lb....15·50@15 75c.
Chili Bars, London, ₱ ton....£80 7s. 5d.
Sheet Copper (according to size), ₱ lb.....25 @38c.
Lead—
Domestic, Common, Spot....4 90@4 95c.
Foreign.....5 20@5·25c.
Sheet ₱ lb.....6¼@6·60c. net
Pipe, ₱ lb.....6c. "
Tin lined Pipe, ₱ lb.....12c. "
Shot, ₱ lb.....6 @ 7c.
Tin—
Tin Plates.....14s. 6d.
Tin Spot.....£166 5s.
Banca pigs, ₱ lb.....36 50c.
Zinc—
Domestic spelter, ₱ lb.....4·90@5¼c.
Foreign spelter, ₱ lb.....5¾@6c
Silesian, ton.....£ 9 10s.
Sheet, American, ₱ lb.....6¾@7
Antimony—Hallet's, per lb.10·50@ 0·75
Cookson's, per lb.....13
Star Antimony.....£46
Quicksilver—Per lb.....63@65c.

IRON AND STEEL.

American Pig-Iron,
No. 1 X.....$20 00@$21.00 at tidewater
No. 2 X.....$18 50@$19.50 " "
Forge.....$16.50@$17.00 " "
Scotch Pig—Coltness.....$20.50@.....
Clyde.....19.50@$19.75
Dalmellington.....19 50@ 19.75
Summerlee.....20 50@ 21.00
Shotts.....20.50@ 20.75
By Cable to-day to the Metal Exchange:
Scotch Warrants.....38s. 11d.
Coltness, at Glasgow.....48s.
Langloan, at Glasgow.....46s.
Summerlee, at Glasgow.....47s. 6d.
Gartsherrie, at Glasgow.....45s.
Glengarnock, at Aidrossan.....44s. 6d.
Dalmellington, at Ardrossan.....40s. 3d.
Eglinton at Ardrossan.....39s. 6d.
Bessemer Pig—
Foreign, nominally.....$20.00@
Domestic.....$18.50@19 at furnace
Spiegeleisen—
German, 20 per cent.....$26.50
English, 20 " " .....$26.50@ 27.00
" 30 " " .....31.00@ 31.50
Ferro Manganese.....52.00@ 53.00
Steel Blooms, nominally.....30.00@.....
Steel Billets, " .....30.00@.....
Steel Nail Slabs, " .....30 5?@.....
Steel Wire Rods, " .....40.50@ 41.00
Steel Rails—
Heavy sections, at mill....$31.50@ 32.50
Light " " .....32.50@ 37.50
Structural Iron and Steel—
Bridge Plate, at mill.....2·10@2·15c.
Angles, at mill.....2·20@2·25c.
Tees, at mill.....2·50@2·70c.
Steel Angles, at mill.....2·50@2·70c.
Beams and Channels, on wharf, 3·c.base
Steel Plates—
Tank and Ship, on wharf.....2 6@2·7c.
Boiler Shell, on wharf.....3 @.....
" Flange, " .....3¼@3½
" Fire-Box, on wharf.....4 @4½
Iron Plates—
Common tank, on wharf....2¼@2 3-10c.
Refined tank, on wharf.....2 4-10@2½c.
Boiler shell, " .....2¼@2 6-10c.
Boiler flange, " .....3½@3 7-10c.
Extra flange, " .....4 @4¼c.
Bar Iron—
Best refined.....2@2·1c. base.
Refined.....1·9@2c. "
Common.....1·8@1 9c. "
Merchant Steel—
American tool.....8½@10c.
Special grades.....13 @20c.
Crucible machinery.....5 @6c
" spring.....4½c.
Bessemer machinery.....2·2@ ·4c.
" spring.....2·2@2·4c.
Cast-Iron Pipe—
According to size.....$27 00@$34.00
Wrought Iron Pipe—
Butt-Welded, Plain and Tarred, 47½ per cent disc; Galv., 37½ per cent disc.
Lap-Welded, Plain and Tarred, 60 per cent disc; Galv., 45 per cent disc.
Boiler Tubes—Per cent disc.....60%
Rail Fastenings—
Spikes.....2·15@2·20c. delv'd
Angle Fish-bars.....1·9 @2
Bolts and Sq. Nuts.....2·9 @ 3c.
" " Hex " .....3·1 @3·2c.
Wrought Scrap—
Foreign, *ex store*.....$20.00@.....
No. 1 Yard *to vessel*.....20.50@.....
Cast Scrap.....15.50@ 16 50
Old Car Wheels.....@ 19 50
Old Rails—Tees.....21 00@.....
—Doubles.....21.50@.....
Nails—In car-load lots.....2 00@2·05c.
—From store.....2·10@2·15c.

Louisville Prices.

Hot Blast Irons—
So. Coke, No. 1.....$18.50@$19.00
" " No. 2.....17 50@ 18 00
" " No. 2½.....17.00@ 17.25
" Charcoal, No. 1.....19.00@ 19.50
" " No. 2.....18.00@ 18.50
Forge Irons—
Neutral Coke.....$16 00@$16.50
Cold Short.....15.00@ 16.00
Mottled.....14.00@ 15.00
Car Wheel and Malleable Irons—
Southern (standard brands).$23.00@$24 00
" (other brands).....19 00@ 20 00
Lake Superior.....24.50@ 25.50

Pittsburg Prices.

Coke or Bituminous Pig—
Foundry No 1.....$17.75@18 00
Foundry No. 2.....16.50@17.00
Gray Forge No. 3.....15.50@.....
" " No. 4.....15.00@15.25
White.....14.00@15.25
Mottled.....16.00@.....
Silvery.....18.00@.....
Bessemer.....17.25@17.75
Charcoal Pig—
Foundry No. 1.....24.00@25.75
Foundry No. 2.....23.00@24.75
Cold-Blast.....26.00@28.00
Warm-Blast.....25.00@27.00
20 p. c. Spiegel.....28 00@28 50
Muck-Bar.....26.75@27.00
Steel Blooms.....29.00@.....
Steel Slabs.....28 50@29.00
Steel Crop Ends.....18 50@
Steel Bloom Ends.....@18 00
Steel Billets.....28.50@29.00
Old Iron Rails.....22.00@22 50 (uncertain)
Old Steel Rails.....20 00@21.00
No. 1 W. Scrap.....19 00@19.50
No. 2 W. Scrap.....18.00@18.50
Steel Rails.....*31.50@32.00
" light sections.....*33.00@34 00
Bar Iron, nominal.....1.85@ 1 90
Nails.....$2.00 car lots
Steel Nails.....$2.00 car lots
Two per cent off for cash.
* At works.

Philadelphia Prices.

Foundry No. 1.....$21.00@21 50
Foundry No. 2.....18.50@19 00
Gray Forge.....17.00@16.00
Bessemer Pig.....20.00@.....
Steel Rail Blooms.....29.50@nom.
Foreign Bessemer.....20 00@20.50
Spiegeleisen.....27.50@.....
Scrap, Selected.....22.00@.....
No. 1.....21.00@20.00
Cargo Scrap.....21.00@20.50
Muck-Bars.....30.50@.....
Merchant Iron.....1.80@ 2.00
Plate Iron.....2.00@ 2.15
Tank Iron.....2 15@ 2.25
Skelp Iron.....1.90@.....
Angles.....2.15@ 2.25
Beams and Channels.....3.30@.....
Nails.....1 90@ 2.00
Steel Rails.....31.50@33.5
Old Rails.....21.00@22.40

STOCK MARKET QUOTATIONS

Baltimore, Md.

COMPANY.	Bid.	Asked.
Atlantic Coal	$1.45	....
Balt. & N. C.	.25	.29
Big Vein Coal	....	....
Conrad Hill	.05	.10
Diamond Tunnel	.55@ .66	.65
George's Crk. C.	95@95.50	97.50@100
Lake Chrome	....	....
N. State, Balto.	.25@ .30	....
Ore Knob	.05	.12
Silver Valley	1.55	1.40@1.75

Highest and lowest prices bid and asked during the week ending April 5th.

Birmingham, Ala.

COMPANY.	Bid.	Asked.
Ala. Cons. C.	10 @ 25	50 @ 00
Bir. Min. & Mfg.	175	195 @ 200
Decatur L. Imp. & Fur.	21¾@ 22½	23½@ 23
Decatur Min. L.	26½	29½@ 30
Sloss I. & S.	....	16 @ 81½
* Sloss I. & S.	....	81
Sheffield C. & I.	81 @ 84	85 @ 87
Woodstock S. & I.	46 @ 46¾	48 @ 48½

* Bonds.

Highest and lowest prices bid and asked during the week ending April 3d.

Pittsburg, Pa.

COMPANY	H.	L.	Closing
Allegheny Gas	35.00	35.00	35.00
Bridgewater Gas.	89 00	89.00	89.00
Charlotte Mg. Co.	2.88	2.88	2 88
Charters Val. Gas.	91.00	89.88	90 00
Consolidated Mg. Co.	.60	.50	.60
Forest Oil Co	....	....	....
Gogebic L. Syn.	....	....	....
La Noria Mining	3.38	3.00	3.38
M'f'turers' Gas	41.00	35.50	36.50
Nat. Gas Co. of W. Va	71.00	70.00	71.00
N. Y. & C. Gas Coal	38 00	38.00	38.00
Ohio Valley Gas	40.00	40.00	40 00
Pennsylvania Gas.	....	....	....
Philadelphia Gas.	50.13	48.13	49.50
Silverton Mining	....	....	....
South Side Gas.	38 00	38 00	38.00
Tuna Oil Co	....	....	....
Washington Oil	....	....	45.00
W't'h'se Air-Brake	....	....	....
Westhouse Brake	....	....	....
Westmoreland & Cambria Gas.	46.00	46.00	46 00
Wheeling Nat. Gas.	25.00	25.00	25 00

Highest and lowest prices bid and asked during the week ending April 5th.

Foreign Quotations.

London. March 24.

COMPANY.	Highest.	Lowest.
Alturas Gold, Idaho	18s. 6d.	17s 6d.
Arizona Copper, Ariz.	22s. 9d.	22s. 3d.
Bimseye Creek, Cal.	9s.	7s.
Carlisle, N. Mex	23s.	22s.
Centennial Cal	12s.	10s.
Colorado United, Colo.	4s 6d.	3s. 6d.
Columbian, S. A.	28s.	26s.
Denver Gold, Colo.	3s	2s.
Dickens Custer, Id.	7s. 6d.	6s. 6d.
Eberhardt, Nev	2s 6d.	1s. 6d.
El Callao, Venezuela	£4⅛	£3⅞
Empire, Mont	£1⅝	£1¼
Flagstaff, Utah	3s. 6d.	2s. 6d.
Garfield, Nev	25s.	24s.
Gold Hill, N. C.	3s.	2s.
Idaho	19s.	18s.
Ilex, Cal	20s.	19s.
Josephine, Cal	£1⅞	£1⅝
Kohinoor, Colo.	2s. 3d.	1s. 9d.
Lady Franklin N. Mex	9s.	7s.
Mason & Barry, Portugal	£1⅛	£1⅛
Montana Lt., Mont	£2¼	£1⅛
New California, Colo.	7s. 6d.	6s. 6d.
New Consolidated	3s. 6d.	2s. 6d.
New Emma, S., Utah	4s.	3s.
New Hoover Hill, N. C.	2s. 6d.	1s. 6d.
New La Plata, Colo.	3s.	2s.
Pittsburg Cons., Nev.	49s.	47s.
Plumas Eureka, Cal.	£1	£¾
Quebrada, Venezuela	£5⅜	£5⅛
Richmond Con., Nev.	£4¼	£4⅛
Ruby & Dunderberg, Nev	4s.	3s.
Russell Gold, N. C.	4s. 6d.	3s. 6d.
Sierra Buttes, Cal.	£¾	£⅛
Stanly, N. C.	£⅛	£⅛
Tolima, Colombia, S. A.	£2⅛	£1⅝
Union Gold, Colo.	4s. 9d.	4s. 3d.
U. S. Placer, Colo.	13s. 6d.	12s. 6d.
Viola Lt., Idaho	32s. 6d.	30s.

*Paris.** March 15.

Boleo	650	650
El Callao	97.50	97.50
Golden River	442.50	442.50
" parts	90	90
" obligations	90	90
Lexington	75	75
" parts	3.75	3 75
Rio Tinto	478.75	478.75
" obligations	512.50	512.50
" nouvelles	492.75	492 75
Tharsis	149 45	149.45

* Francs.

DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Shares. Par	Assessments. Total levied.	Assessments. Date and amount of last.			Dividends. Total paid.	Dividends. Date and amount of last.		
1	Adams, S. L.	Colo.	$1,500,000	150,000	$10	*	....	....	....	$555,000	Jan.	1887	.15
2	Alice, S. C.	Mont	10,000,000	400,000	25	*	....	....	....	750,000	Sept	1886	.06¼
3	Alturas, G.	Idah.	1,500,000	300,000	5	....	....	....	....	95,000	Sept	1886	.50
4	Amy & Silversmith, S.	Mon.	....	341,419	....	....	....	....	....	247,530	Aug	1887	.12½
5	Atlantic, C.	Mich	1,000,000	40,000	25	$280,000	Apl.	1875	$1.00	420,000	Feb.	1888	1.50
6	Argenta, S.	Nev.	10,000,000	100,000	100	350,000	July	1885	.10	40,000	Feb.	1880	.20
7	Aurora, L.	Mich.	2,000,000	100,000	20	*	....	....	....	155,000	Oct	1887	1.87½
8	Bassick, G. S.	Colo.	10,000,000	100,000	100	....	....	....	....	400,000	Mar.	1884	1.00
9	Belle Isle, S.	Nev.	10,000,000	100,000	100	145,000	Feb	1887	.20	300,000	Dec.	1879	.25
10	Belcher, G. S.	Nev.	10,400,000	104,000	100	2,663,000	Mar.	1888	.50	15,397,200	Apl	1874	1 00
11	Bellevue Idaho, S. L.	Idah.	1,250,000	125,000	10	57,500	Nov.	1887	25	187,500	Jan	1887	.10
12	Big B'nd Hydraulic, G	Dak.	1,000,000	200,000	5	*	....	....	....	258,000	Aug.	1887	.03
13	Black Bear, G.	Cal.	3,000,000	30,000	100	22,500	Dec.	1884	.25	895,000	May	1883	.20
14	Bodie Con., G. S.	Cal.	10,000,000	100,000	100	450,000	Feb.	1888	.50	1,295,000	Apl.	1885	.50
15	Bonanza Develop't	C&M	3,000,000	300,000	10	*	....	....	....	135,000	Dec.	1882	.15
16	Bonanza K'g, Cons. S.	Cal.	1,000,000	100,000	10	*	....	....	....	185,000	Feb.	1880	.10
17	Boston & Mont, G.	Mont	2,500,000	250,000	10	*	....	....	....	520,000	Jun	1886	.15
18	Breece, S.	Colo.	5,000,000	200,000	25	*	....	....	....	2,000	Feb.	1880	.01
19	Brooklyn Lead, L. S.	Utah	500,000	50,000	10	....	....	....	....	127,000	July	1887	.05
20	Bulwer, G.	Cal.	10,000,000	100,000	100	60,000	July	1887	20	175,000	Jan.	1884	.10
21	Caledonia, G.	Dak.	10,000,000	100,000	100	505,000	May	1885	.15	40,000	Feb.	1886	.10
22	Calumet & Hecla, C.	Mich	2,500,000	100,000	25	1,200,000	....	....	....	29,850,000	Apl.	1888	5.00
23	Carbonate Hill, S. L.	Colo.	2,000,000	200,000	10	*	....	....	....	80,000	Apl.	1884	.05
24	Caribou Con., S.	Colo.	1,500,000	150,000	10	*	....	....	....	50,000	Mch	1880	.10
25	Castle Creek, G.	Idah.	100,000	100,000	1	....	....	....	....	51,000	Oct.	1883	.03
26	Catalpa, S. L.	Colo.	3,000,000	300,000	10	*	....	....	....	270,000	May	1884	.10
27	Central, C.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,860,000	Feb.	1888	2.00
28	Christy, S.	Utah	10,000,000	100,000	100	*	....	....	....	10,000	Jun.	1886	.10
29	Chrysolite, S.	Colo.	10,000,000	200,000	50	*	....	....	....	1,650,000	Apl.	1884	.25
30	Colorado Central, S. L	Colo.	2,750,000	275,000	10	*	....	....	....	296,250	Apl	1888	.05
31	Cons. Cal. & Va., G. S	Nev.	21,600,000	216,000	100	108,000	Jan.	1885	.20	1,684,800	Apl	1888	.50
32	Con. Gold Mining, G.	Ga.	500,000	100,000	5	....	....	....	....	108,000	Nov.	1888	02
33	Contention, S.	Ariz.	12,500,000	250,000	50	*	....	....	....	2,587,000	Dec.	1884	.25
34	Crescent, S. L. G.	Utah	15,000,000	600,000	25	....	....	....	....	210,000	Aug.	1886	.05
35	Crown Point, G. S.	Nev.	10,000,000	400,000	25	2,725 00	Jan.	1888	.50	11,584,000	Jan.	1875	2.00
36	Daly, S. L.	Utah	3,000,000	150,000	20	....	....	....	....	525,000	Mar.	1888	.50
37	Deadwood-Terra, G.	Dak.	5,000,000	200,000	25	*	....	....	....	11,000,000	Nov	1887	.10
38	Derbec B. Grav., G. S.	Cal.	10,000,000	100,000	100	90, 0	Dec.	1881	.10	180,000	May	1887	.10
39	Dunkin, S. L.	Colo.	5,000,000	200 000	25	*	....	....	....	330,000	Apl	1888	.15
40	Eclipse	Colo.	100,000	100,000	1	....	....	....	....	20,000	Nov.	1887	.10
41	Elkhorn, G. S.	Mont	1,000,000	100,000	10	50,0	July	1883	.50	170,000	July	1887	.05
42	Empire L., G.	Mont	500,000	100,000	5	....	....	....	....	7,500	Oct.	1887	.37½
43	Eureka Con., G. S. L.	Nev.	5,000,000	50,000	100	600,000	July	1886	1.00	4,883,500	Apl.	1888	.25
44	Evening Star, S. L.	Colo.	500,000	50,000	10	*	....	....	....	1,400,000	Nov	1883	.50
45	Excelsior, G.	Cal.	10,000,000	100,000	100	560,000	Sept	1845	1.00	875,000	Oct.	1880	.25
46	Father de Smet, G.	Dak.	10,000,000	100 000	100	200,000	Nov	1878	1.00	1,125,000	Dec.	1888	.20
47	Franklin, C.	Mich	1,000,000	40,000	25	220,000	Jun.	1871	....	644,000	Jan.	1885	1.00
48	Freeland, G. S. C.	Colo.	5,000,000	200,000	25	*	....	....	....	190,000	July	1886	.10
49	Fresno Enterprise, G	Cal.	5,000,000	100,000	50	....	Mch	1883	.10	110,000	July	1882	1.00
50	Garfield Lt., G. S.	Nev.	500,000	100,000	5	....	....	....	....	60,000	Mar	1887	.12½
51	Joiconda, G. S.	Idah.	1,000,000	100,000	10	....	....	....	....	120,000	May	1888	.05
52	Gould & Curry, G. S.	Nev.	10,800,000	108,000	100	5,251,000	Mar.	1888	.50	3,826,830	Oct.	1870	10.00
53	Grand Central, S.	Ariz.	1,000,000	100,000	10	....	....	....	....	625,000	Dec.	1882	.25
54	Grand Prize, S.	Nev.	10,000,000	100,000	100	570,000	Apl.	1886	.50	495,000	Mar.	1881	.25
55	Granite, S.	Colo.	125,000	125,000	1	....	....	....	....	6,250	May	1883	.01
56	Granite Mountain, S.	Mont	10,000,000	400,000	25	*	....	....	....	4,400,000	Apl.	1888	.50
57	Green Mountain, G.	Cal.	1,250,000	125,000	10	*	....	....	....	212,000	Nov.	1881	.07½
58	Hale & Norcross, G. S.	Nev.	11,200,000	112,000	100	5,086,000	July	1887	.50	1,598,000	Apl	1871	5.00
59	Hall-Anderson, G.	N. S.	150,000	150,000	1	....	....	....	....	7,000	Jan.	1887	.05
60	decla Con., G. S. L. C	Mont	1,500,000	30,000	50	*	....	....	....	1,077,5	Dec	1887	.50
61	Hei'a Mg & Red, G. S. L	Mont	3,315,000	663,000	5	*	....	....	....	197,37	July	1886	.06
62	Holmes, S.	Nev.	10,000,000	100,000	100	300,000	Sept	1885	10	70,000	Apl.	1886	.25
63	Holyoke, G.	Idah.	200,000	200,000	1	....	....	....	....	27 000	Feb.	1885	.10
64	Homestake, G.	Dak.	12,500,000	125,000	100	200,000	July	1879	1.00	4,068,750	Mar	1888	.20
65	Honorine, S. L.	Utah	5 00,000	250,000	2	25,000	Jun.	1883	....	12 ,000	Sept	1887	.05
66	Hope, S.	Mont	1,000,000	100,000	10	*	....	....	....	208,252	Jan.	1888	.25
67	Horn-Silver, S. L.	Utah	10,000,000	400,000	25	*	....	....	....	4,000,000	Nov	1884	.50
68	Idaho, G.	Cal.	310,000	3,100	100	....	....	....	....	4,777,000	Mar	1888	7.50
69	Ideal, S. L.	Utah	1,500,000	30,000	10	....	....	....	....	15,000	Dec.	1886	.05
70	Illinois, S.	N. M.	100,000	100,000	1	....	....	....	....	25,000	Jan	1887	.25
71	Independence, S.	Nev.	10,000,000	100,000	100	340,000	Oct.	1886	.20	225,000	Sept	1879	.25
72	Indian Queen, S.	Nev.	250,000	125,000	2	....	....	....	....	368,750	July	1883	.03
73	Iron Hill, S.	Dak.	2,500,000	250,000	10	101,250	Mar.	1888	.07½	156,250	Nov.	1887	.07½
74	Iron-Silver, S. L.	Colo.	10,000,000	500,000	20	*	....	....	....	2,200,000	Feb.	1888	.20
75	Jackson, G. S.	Nev	5,000,000	50,000	100	10,000	Nov	1880	.20	45,000	Oct.	1880	.10
76	Jay Gould	Mont	2,000,000	4 00	5	....	....	....	....	171,000	Mar.	1888	.09
77	Jacalstita, S.	Mex.	2,500,000	250,000	10	*	....	....	....	1,200,000	Feb.	1885	.50
78	Jumbo, G.	Colo.	2,000,000	200,000	10	....	....	....	....	35,000	Oct.	1887	.02½
79	Kentuck	Nev.	3,000,000	30,000	100	342,000	Nov	1881	.30	1,350,000	Dec.	1886	.10
80	La Plata, S. L.	Colo.	2,000,000	200,000	10	*	....	....	....	610,000	Sept	1882	.30
81	Leadville Cons., S. L.	Colo.	4,000,000	400,000	10	*	....	....	....	423,000	Apl	1887	.05
82	Lexington, G. S.	Mont	4,000,000	40,000	100	*	....	....	....	565,000	Jan	1885	2.00
83	Little Chief, S. L.	Colo.	10,000,000	200,000	50	*	....	....	....	780,000	Feb	1885	.10
84	Little Pittsburg, S. L	Colo.	20,000,000	200,000	100	*	....	....	....	1,050,000	Mch.	1880	50
85	Manhattan, S.	Nev	5,000,000	50,000	100	250,000	Dec	1887	1.00	437,500	Feb	1886	.25
86	Marguerite, G.	Cal.	500,000	25,000	20	....	....	....	....	18,750	Oct.	1882	.25
87	Marion Bullion, G.	N.C	500,000	....	....	....	....	....	....	15,000	Jan	1886	....
88	Martin White, S.	Nev.	10,000,000	100,000	100	1,150,000	Mar.	1886	25	140,000	Dec.	1886	.25
89	Mary Murphy, G. S.	Colo.	350,000	3,500	100	....	....	....	....	122,500	Feb	1888	5.00
90	Minnesota, C.	Mich	1,000,000	40,000	25	420,000	Apl	1888	1 00	1,825,000	Mar.	1876	....
91	Mono, G.	Cal.	5,000,000	5,000	100	616,000	Sept	1887	.50	12,500	Mar.	1856	.25
92	Montana, Lt., G. S.	Mont	3,300,000	660,000	5	*	....	....	....	1,845,93	Jan.	1858	.25
93	Morning Star, S. L.	Colo.	1,000,000	100,000	10	....	....	....	....	775,000	Mar.	1888	.25
94	Moulton, S. G.	Mont	2,000,000	400,000	5	*	....	....	....	380,000	Dec.	1887	.07½
95	Mount Pleasant, G.	Cal.	150,000	150,000	1	*	....	....	....	150,000	Feb.	1887	.30
96	Mt. Diablo, S.	Nev	5,000,000	50,000	100	137,500	Jun.	1880	2.00	80,000	July	1885	.20
97	Napa, Q.	Cal.	500,000	50,000	10	*	....	....	....	250,000	Jan.	1883	.10
98	Navajo, G. S.	Nev.	10,000,000	100,000	100	455,000	Jan.	1888	.30	325,000	Feb.	1880	.25
99	N. Hoover Hill, G. S.	N. C.	300,000	120,000	2½	*	....	....	....	30,000	Dec.	1885	.06¼
100	Northern Belle, S.	Nev.	5,000,000	50,000	100	425,000	Jan.	1884	8.00	2,400,000	Apl.	1883	50
101	North Belle Isle, S.	Nev.	10,000,000	100,000	100	250,000	dar	1887	.50	130,000	Mar.	1888	.50
102	Ontario, S. L.	Utah	15,000,000	150,000	100	....	....	....	....	9,050,000	Mar.	1888	.50
103	Ophir, G. S.	Nev.	10,000,000	100,000	100	4,059,440	Aug	1887	.50	1,595,800	July	1882	1.00
104	Original, G.	Mont	1,500,000	240,000	25	*	....	....	....	20,000	Feb.	1886	.10
105	Osceola, C.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	1,072,500	Dec	1887	1 00
106	Oxford, G.	N. S.	125,000	125,000	1	*	....	....	....	31,500	Oct.	1885	.02
107	Paradise Valley, G. S	Nev.	10,000,000	100,000	100	47,000	Mar.	1882	.15	150,000	Apl.	1887	.10
108	Parrott, C.	Mont	1,800,000	180,000	10	*	....	....	....	154,000	Jan.	1888	.10
109	Peacock, S. G. C.	N.M.	2,000,000	200,000	10	*	....	....	....	60,000	Nov.	1886	....
110	Pleasant Valley, G. S.	Cal.	10,000,000	100,000	100	10,000	Mar.	1884	.10	30,000	Dec.	1882	.05
111	Plutus, G. S. C. L.	Colo.	2,000,000	100,000	10	*	....	....	....	20,000	Feb.	1886	.10
112	Plymouth Con., G.	Cal.	5,000,000	100,000	50	....	....	....	....	2,280,000	Feb.	1888	.40
113	Prussian, S. L.	Colo.	1,500,000	150,000	10	....	....	....	....	132 000	Jan	1883	.10
114	Quicksilver, pref., Q	Cal.	4,300,000	43,000	100	....	....	....	....	1,267,192	Feb.	1888	2.00
115	" com., Q	Cal.,	5,700,000	57,000	100	....	....	....	....	151,000	July	1882	.40
116	Quincy, C.	Mich	1,000,000	40,000	25	200,000	Dec.	1862	....	4,770,000	Feb.	1888	4.00
117	Richmond, S. L.	Nev.	1,350,000	54,000	25	*	....	....	....	4,312,537	Jun.	1887	1.25
118	Ridge, G.	Colo.	5,000,000	200,000	25	219,939	Mar	1886	.50	93,735	Feb.	1880	.50
119	Rising Sun, S.	Dak.	750,000	150,000	5	*	....	....	....	52,000	May	1881	.07½
120	Robinson Con., S. L.	Colo.	10,000,000	200,000	50	*	....	....	....	585,000	Mar.	1886	.05
121	Robert E. Lee, S. L.	Colo	10,000,000	500,000	20	....	....	....	....	100,000	Dec.	1882	.50
122	Rooks, G.	Vt.	500,000	50,000	10	*	....	....	....	61,000	Apr	1885	.40
123	Savage, S.	Nev.	11,200,000	112,000	100	6,324,000	Sept	1887	50	4,480,000	July	1869	3.00
124	Security L. Mg., Mfg.	Colo.	1,000,000	100,000	10	*	....	....	....	50,000	July	1884	....
125	Snohome, G.	Idah.	1,000,000	100,000	10	*	....	....	....	7,500	Apl.	1883	.01
126	Sierra Buttes, G.	Cal.	2,225,000	122,500	10	....	....	....	....	1,477,245	Oct.	1887	31½
127	Sierra Grande, S.	N. M.	2,500,000	500,000	5	....	....	....	....	860,000	Sept	1884	.25
128	Sierra Nevada, G. S.	Nev.	10,000,000	100,000	100	6,100,000	Apl.	1888	.25	102,000	Jan.	1871	1.00
129	Silver Cord, G. S. L.	Colo.	5,000,000	500,000	10	*	....	....	....	225,000	Nov.	1883	.25
130	Silver King, S.	Ariz.	10,000,000	100,000	100	*	....	....	....	1,050,000	July	1887	.25
131	Silverton, G. S. L.	Colo.	2,000,000	200,000	10	*	....	....	....	80,000	Nov.	1886	.02
132	Small Hopes Cons., S.	Colo.	5,000,000	250,000	20	....	....	....	....	3,112,500	Dec.	1887	.20
133	Smuggler, S. L.	Colo.	600,000	60,000	10	....	....	....	....	66,700	Aug.	1883	.25
134	Socorro, C.	N. M.	250,000	2,5 0	100	....	....	....	....	4,000	Mch	1882	.00¾
135	Spring Valley, G.	Cal.	200,000	2 ,000	1	50,000	Oct.	1886	.25	50,000	Jan	1881	.25
136	Standard, G. S.	Cal.	10 000,00	1 0 000	100	25,000	Oct.	1884	.25	3,585,000	Apl	1888	.10
137	Stormont, S.	Utah	500,000	500,000	1	*	....	....	....	155,000	Nov.	1881	.05
138	St. Joseph, L.	Mo.	1,500,000	150,000	10	*	....	....	....	844,000	Dec.	1887	.20
139	Surinam, G.	D. G.	3,000,000	60,000	5	....	....	....	....	105,000	Nov.	1887	.05
140	Swansea, C.	Colo.	600,000	60,000	10	....	....	....	....	5,000	Dec.	1887	.02½
141	Syndicate, G.	Cal.	10,000,000	100,000	100	38,729	July	1882	.15	48,308	Sept	1885	.10
142	Tamarack, C.	Mich.	1,000,000	40,000	25	520,000	Apl.	1885	3.00	120,000	Apl.	1888	3.00
143	Tip Top, S.	Ariz.	10,000,000	100,000	100	250,000	Sept	1883	.25	100,000	Nov.	1881	.20
144	Tombstone, G. S. L.	Ariz.	12,500,000	500,000	25	*	....	....	....	1,250,000	Apl.	1882	.10
145	United Verde, C.	Ariz.	3,000,000	300,000	10	*	....	....	....	97,500	Feb.	1884	.20
146	Valencia, M.	N. M.	150,000	1,500	100	....	....	....	....	37,500	Apl	1886	2.50
147	Viola L., S. L.	Utah	750,000	150,000	5	....	....	....	....	222,500	Dec.	1887	.12
148	Vizina, S.	Ariz.	5,000,000	200,000	25	*	....	....	....	140,000	Apl.	1882	.10
149	Yankee Girl	Colo.	2,500,000	250,000	10	....	....	....	....	1,275,000	July	1887	.10
150	Yellow Jacket, G. S.	Nev.	12,000,000	120,000	100	5,448 000	Dec	1885	.75	2,184,000	Aug.	1871	1.50

NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Shares. Par Value	Assessments. Total levied.	Assessments. Date & amo'nt of last,			
1	Agassiz Cons., S. L.	Colo.	$2,500,000	50,000	$50	....	....	....	....	....
2	Alhonet, C.	Mich	2,000,000	80,000	25	$577,000	Feb	1888	....	....
3	Alpha Con., G. S.	Nev.	3,000,000	30,000	100	536,250	Jan.	1888	87½	....
4	Alta, S.	Nev.	10,080,000	100,800	100	2,140,800	Nov	1887	.50	....
5	Amador, G.	Cal.	400,000	200,000	2	*	....	....	....	....
6	American Flag, S.	Colo.	1,250,000	125,000	10	300,000	Jun	1877	.50	....
7	Angio-Montana, Lt.	Mon.	600,000	120,000	5	....	....	....	....	....
8	Appalachian, Lt., G.	N. C.	1,500,000	300,000	5	....	....	....	....	....
9	Aspen Mg. & S., S. L.	Colo.	2,000,000	200,000	10	....	....	....	....	....
10	Barcelona, G.	Nev.	5,000,000	200,000	25	*	....	....	....	....
11	Bechtel Con., G.	Cal.	10,000,000	100,000	100	173,500	Jan.	1888	.10	....
12	Belmont, S.	Nev.	5,000,000	50,000	100	735,000	Apl.	1886	.10	....
13	Best & Belcher, G. S.	Nev.	10,080,000	100,800	100	2,004,190	Jan.	1888	.50	....
14	Big Pittsburg, S. L.	Colo.	20,000,000	200,000	100	*	....	....	....	....
15	Bi Metallic, S.	Mon.	5,000,000	200,000	25	*	....	....	....	....
16	Black Oak, G.	Cal.	3,000,000	300,000	10	*	....	....	....	....
17	Boston Con., G.	Cal.	10,000,000	100,000	100	170,000	Nov	1883	.25	....
18	Boston & Mont., C. S.	Mon.	2,500,000	100,000	25	*	....	....	....	....
19	Bremen, S.	N. M	5,000,000	500,000	10	*	....	....	....	....
20	Brunswick, G.	Cal.	2,000 000	400,000	5	*	....	....	....	....
21	Bullion, G. S.	Nev.	10,000,000	100,000	100	3,957,000	Aug.	1887	.50	....
22	Bye and Lily, S.	Ariz.	1,000,000	200,000	5	*	....	....	....	....
23	Calaveras, G.	Cal.	500,000	500,000	1	*	....	....	....	....
24	Carisa, G.	Wy.	500,000	100,000	5	*	....	....	....	....
25	Carupano, G. S. L. C.	Ven.	230,000	100,000	2	*	....	....	....	....
26	Cashier, G. S.	Colo.	500,000	250,000	2	*	....	....	....	....
27	Cen Contin'l, G. S. L.	C.&A	2,000,000	200,000	10	*	....	....	....	....
28	Charles Dickens, G. S.	Idah.	1,250,000	250,000	5	*	....	....	....	....
29	Cherokee, G.	Cal.	1,500,000	150,000	10	....	....	....	....	....
30	Chollar, S.	Nev.	11,200,000	112,000	100	1,208,000	Dec.	1887	.50	....
31	Cinnamon Mt., G. S	Colo.	750,000	150,000	5	*	....	....	....	....
32	Cleveland, T.	Dak.	1,000,000	500,000	2	*	....	....	....	....
33	Comstock, G. S.	Nev.	10,000,000	100,000	100	30 000	Mar.	1887	.15	....
34	Con. Imperial, G. S.	Nev.	5,000,000	50,000	100	1,175,000	Sept	1887	.25	....
35	Con. Pacific, G.	Cal.	6,000 000	60,000	100	177,000	Sept	1887	.10	....
36	Cons Silver, S.	Mo.	2,500,000	250,000	10	....	....	....	....	....
37	**Cop. Queen Cons, C	Ariz	1,400 000	140,000	10	....	....	....	....	....
38	Courtlandt	Colo.	500,000	50,000	10	....	....	....	....	....
39	Crescent, S. L.	Colo.	3,000,000	300,000	10	*	....	....	....	....
40	Crocker, S.	Ariz.	10,000,000	100,000	100	105,000	Feb.	1888	.20	....
41	Crowell, G.	N. C.	500,000	500,000	1	....	....	....	....	....
42	Dahlonega, G.	Ga.	250,000	250,000	1	*	....	....	....	....
43	Dandy, S.	Colo.	5,000,000	500,000	10	....	....	....	....	....
44	Dardanelles, G.	Cal.	1,000,000	100,000	10	....	....	....	....	....
45	Decatur, S.	Colo.	1,500,000	300,000	5	*	....	....	....	....
46	Denver City, S. L.	Colo.	5,000,000	500,000	10	*	....	....	....	....
47	Denver Gold, G.	Colo.	300,000	60,000	5	....	....	....	....	....
48	Deseret, G. S.	Utah	500,000	50,000	10	....	....	....	....	....
49	Durango, G.	Colo.	500,000	500,000	1	....	....	....	....	....
50	Eastern Dev. Co., Lt.	N. S.	1,500,000	150 000	10	990,000	Mar.	1886	1.00	....
51	El Cristo, G. S.	U.S.C	1,000,000	500,000	2	*	....	....	....	....
52	El Dorado, G.	Cal.	1,000,000	250,000	4	*	....	....	....	....
53	El Talento, G.	U.S.C	1,000,000	500,000	2	*	....	....	....	....
54	Empire, S.	Utah	10,000,000	100,000	100	....	....	....	....	....
55	Eureka Tunnel, S. L.	Nev.	10,000,000	100,000	100	*	....	....	....	....
56	Excnequer.	Nev	10,000,00	100,000	100	770,000	Feb.	1888	.30	....
57	Found Treasure, S.	Nev.	10,000,000	100,000	100	12,000	Jan.	1888	.06	....
58	Gogebic I. Sya., I.	Wis.	5,000,000	200,000	25	....	....	....	....	....
59	Gold Cup, S.	Colo.	5 00,000	500,000	1	*	....	....	....	....
60	Golden Era, S.	Mon.	2 000,000	200,000	10	*	....	....	....	....
61	Gold Placer, G.	Colo.	5,000,000	200,000	25	229,314	Dec.	1885	.25	....
62	Gold Rock, G.	Cal.	1,000,000	500,000	2	*	....	....	....	....
63	Goodsnaw, G.	Colo.	10,000,00	100,000	100	*	....	....	....	....
64	Grand Belt, C.	Tex.	12,000,00	120,000	100	....	....	....	....	....
65	Grand Duke.	Colo.	800,000	80,000	10	....	....	....	....	....
66	Great Romance, G.	U.S.C	1,0 0,0 0	50,000	2	*	....	....	....	....
67	Gregory-Boutan, G.	Colo.	550,000	550,000	1	*	....	....	....	....
68	Gregory Con., G.	Mon.	3,000,000	300,000	10	....	....	....	....	....
69	Harrison M. Co., G.	Cal.	1,000,000	200,000	5	....	....	....	....	....
70	Head Cent. & Fr. S. G	Utah	10,000,00	100,000	100	....	....	....	....	....
71	Hector, G.	Cal.	1,500,000	300,000	5	....	....	....	....	....
72	Highland, C.	Mich	500,000	25,000	25	....	....	....	....	....
73	Hortense, S.	Colo.	2,000,00	200,000	10	....	....	....	....	....
74	Huron, C.	Mich	1,000,000	40,000	25	280,000	May	1887	3 0	....
75	Iron Gold & Silver, S	N. M	2,000,000	200,000	10	*	....	....	....	....
76	Ironton, I.	Wis.	1,000,000	4 0,00	25	....	....	....	....	....
77	Iroquois, C.	Mich	1,250,000	50,000	25	....	....	....	....	....
78	J. D. Reymert.	Ariz	10,000,000	100,000	100	*	....	....	....	....
79	Julia Cons., G. S.	Nev.	11,000,00	110,000	100	1,650,000	Apl.	1887	.10	....
80	Kearsarge, C.	Mich	1 250,000	50,000	25	190,000	Oct.	1887	1.00	....
81	Ladede.	N. M.	2,000,000	200,000	10	*	....	....	....	....
82	Lake Basin, S. L.	Colo.	1,000,000	100,000	10	*	....	....	....	....
83	Lee Basin, S. L.	Colo.	5,000,000	500,000	10	*	....	....	....	....
84	Lochiel, S.	N. M.	2,000,000	200,000	10	*	....	....	....	....

NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	March 31.		April 2.		April 3.		April 4.		April 5.		April 6.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Adams, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	....
Alice, Mont	....	....	.....	.....	....	....	....	....	.....	.....	.....	.....	.....
Argenta, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
Atlantic, Mich.	....	....	....	....	....	....	....	....	.11	....	....	....	200
Bassick, Colo.	....	....	....	....	7 13	.....	....	....	....	....	....	....	200
Belcher, Nev	....	....	....	....	.75	....	....	....	.70	....	....	....	1,300
Belle Isle, Nev.	2.60	....	....	....	....	....	2 50	....	2 55	....	....	....	750
Bodie Cons., Cal.	....	....	....	....	....	....	....	....	....	....	....	....	....
Breece, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bulwer, Cal	....	....	1.75	....	....	....	....	....	....	....	....	....	100
Caledonia, Dak	....	....	....	....	....	....	....	....	235¼	....	....	....	10
Calumet & Hecla	....	....	....	....	....	....	....	....	....	....	....	....	....
Catalpa, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
Chollar, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
Carysolite, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	....
Colorado Cent'l, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	....
Cons. Cal. & Va., Nev.	....	....	....	....	15 13	....	15.90	....	....	....	15.50	14.25	635
Crown Point, Nev	7.15	....	....	....	6 88	....	....	....	....	....	....	....	200
Deadwood, Dak	....	....	1.85	1.75	1 55	1.50	....	....	....	....	....	....	270
Dunkin, Colo.	....	....	....	....	1 30	....	....	....	....	....	....	....	200
Eureka Cons., Nev	....	....	....	....	....	....	....	....	....	....	....	....	....
Father de Smet, Dak.	....	....	....	....	....	....	....	....	....	....	.40	....	200
Freeland, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	....
Gould & Curry, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
Grand Prize, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
Green Mountain, Cal.	....	....	....	....	....	....	....	....	....	....	....	....	....
Hale & Norcross, Nev.	....	....	....	....	10 25	....	....	....	....	....	....	....	100
Holyoke, Idaho	....	....	.07	....	.07	....	.06	....	.06	....	.07	....	1,500
Homestake, Dak	....	....	....	....	....	....	....	....	....	....	....	....	....
Horn-Silver, Ut.	1.05	1.00	1.00	....	....	....	....	....	....	....	1.00	....	600
Iron Hill, Dak.	....	....	....	....	.35	....	....	....	....	....	....	....	100
Iron Silver, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	....
Leadville C., Colo.	.38	....	....	....	....	....	....	....	....	....	....	....	10
Little Chief, Colo.	....	....	....	....	.23	.22	.29	.25	....	....	....	....	3,400
Little Pittsburg, Colo.	....	....	....	....	.25	....	....	....	....	....	....	....	50
Martin White, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
Mono, Cal	1.95	....	....	....	....	....	....	....	....	....	1.80	1.75	700
Moulton, Mont.	....	....	....	....	....	....	....	....	....	....	....	....	....
Mount Diablo, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
Navajo, Nev.	....	....	....	....	....	....	1.85	....	....	....	1.90	1.85	800
North Belle Isle, Nev.	7 25	7.00	....	....	....	....	....	....	....	....	....	....	400
Ontario, Ut	28 50	....	....	....	....	....	....	....	28.50	27 50	....	....	75
Ophir, Nev.	11.13	....	....	....	10.88	....	....	....	....	....	....	....	200
Pewabic, Mich.	....	....	....	....	....	....	....	....	....	....	....	....	....
Plymouth, Cal.	....	....	....	....	9.75	8.75	9.00	8.50	8.75	....	9.10	9.00	1,160
Quicksilver Pref., Cal	33.00	....	....	....	....	....	....	....	....	....	....	....	100
" Com., Cal.	....	....	....	....	....	....	....	....	....	....	....	....	....
Quincy, Mich.	....	....	....	....	....	....	....	....	69 88	....	....	....	20
Ridge, Mich.	....	....	....	....	....	....	....	....	....	....	....	....	....
Robinson Cons., Colo.	....	....	....	....	....	....	....	....	....	....	1 85	....	300
Savage, Nev.	....	....	....	....	6.63	....	....	....	....	....	....	....	100
Sierra Nevada, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver King, Ariz.	....	....	5.25	....	....	....	....	....	5.25	4 88	....	....	800
Small Hopes, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard, Cal.	....	....	....	....	....	....	3.25	3.00	....	....	3.25	....	400
Stormont, Ut.	....	....	....	....	....	....	.45	....	....	....	....	....	700
Yellow Jacket, Nev.	9.88	....	....	....	9.13	....	....	....	....	....	6.63	....	300

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	March 31.		April 2.		April 3.		April 4.		April 5.		April 6.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
†Allouez, Mich.	....	....	....	....	....	....	....	....	....	....	....	....	....
Alta, Nev.	2 55	....	....	....	....	....	....	....	....	....	2.40	....	300
Amador, Cal.	1.75	1.70	1.70	1.65	1.65	....	2.00	1.65	2.25	2.10	2 30	2 20	5,200
Am'can Flag, Colo.	.08	....	....	....	....	....	....	....	....	....	....	....	100
Barcelona, Nev.	....	....	.54	....	.55	....	....	....	.52	....	....	....	1,100
Bechtel Con., Cal.	....	....	....	....	....	....	....	....	....	....	....	....	....
Best & B'licher, Nev.	6.25	....	....	....	6 13	....	....	....	....	....	....	....	400
Brunswick, Cal.	.23	.22	.22	....	.23	.21	.23	.20	.22	.21	.21	.19	9,700
Bullion, Nev.	2 95	....	2.90	....	....	....	....	....	2 4	....	2.20	....	7 0
Carupano, Venez.	2.00	....	2.00	....	2.00	....	2.00	....	2 00	....	2 00	....	700
Cashier, Colo	....	....	.13	.12	....	....	.12	....	....	....	....	....	1,200
Castle Creek, Id.	....	....	....	....	....	....	....	....	....	....	.08	....	200
Central Ariz., Ariz.	....	....	....	....	....	....	....	....	....	....	....	....	....
Cleveland, Dak.	1 55	....	1.55	....	....	....	1.60	1.55	1.60	....	1.60	....	600
Confidence, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
Con. Imperial, Nev	....	....	....	....	....	....	....	....	....	....	....	....	....
Con Pacific.	....	....	....	....	....	....	....	....	....	....	....	....	....
Denver City, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	....
Eastern Oregon	....	....	....	....	....	....	....	....	....	....	....	....	....
El Cristo, U. S. Col.	2.50	2 40	2.50	2.40	2.60	2.50	2 60	....	....	....	2.90	2.60	3,400
Excelsior, Colo.	.48	....	....	....	....	....	.50	....	.49	....	.48	....	600
Exchequer, Nev.	2.40	....	2.10	....	....	....	....	....	1.95	....	....	....	200
Found Treas'e, Nev.	....	....	....	....	2.10	2.00	2 10	....	2.10	....	2.10	....	500
Hector, Cal.	....	....	....	....	....	....	....	....	....	....	....	....	....
Huron, Mich.	....	....	....	....	....	....	....	....	....	....	....	....	....
Julia, Nev.	.75	....	.70	....	....	....	....	....	.65	....	.65	....	850
Kingst'n & Pemb'ke	....	....	....	....	2.00	....	....	....	2.00	....	....	....	200
Kossuth, Nev.	....	....	....	....	....	....	....	....	.22	....	....	....	700
Lacrosse, Colo	....	....	....	....	....	....	....	....	....	....	....	....	....
Lee Basin, Colo	.16	....	.56	....	....	....	....	....	....	....	....	....	800
Mexican, Nev.	5 88	....	....	....	....	....	....	....	....	....	....	....	....
Middle Bar, Cal.	.53	....	.53	....	.54	52	.53	.52	.53	.52	.52	....	3,500
Moniter, Colo.	.12	....	....	....	.14	....	.12	....	....	....	....	....	1,200
†National, Mich.	....	....	....	....	....	....	....	....	....	....	....	....	....
Ori'nt'l & Mil'r, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
Phoenix Lead	.45	....	....	....	....	....	....	....	....	....	....	....	100
Phenix of Arizona	....	....	....	....	....	....	....	....	....	....	....	....	....
Potosi, Nev.	5 88	....	....	....	....	....	....	....	....	....	....	....	200
Proustite, Idaho	1.95	....	1.95	1.90	1.95	1.85	1.90	1.85	1.85	....	1.85	....	4,200
Rappanann'k, Va.	.19	....	....	....	....	....	....	....	....	....	.18	....	1,600
Red Elephant, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	....
San Sebastian, S'nS	....	....	....	....	....	....	....	....	....	....	....	....	....
Santiago, U. S. Col.	....	....	....	....	....	....	....	....	....	....	....	....	....
Scorpion, Nev	....	....	....	....	....	....	....	....	.97	....	1.00	....	150
*Security, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Cliff, Colo	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Cord	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Hill	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Mg. of L. V.	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Queen, Ariz.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sutro Tunnel, Nev.	.13	....	.12	....	.12	.11	.13	.12	....	....	....	....	4,400
Taylor Plumas, Cal.	....	....	02	....	....	....	.02	....	....	....	....	....	1,500
Tornado, Nev.	.75	....	.75	....	.70	....	.70	....	.75	....	.70	....	1,700
Union Cons., Nev.	5.13	....	....	....	....	....	....	....	....	....	....	....	200
Utah, Nev	....	....	....	....	....	....	2.40	....	....	....	2.20	....	2 30	....	500
Washington, Mich.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Winthrop	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

*Dealt in at the New York Stock Ex. Unlisted Securities. †Dealt in at the Metal Ex. ‡Assessment unpaid. Dividend shares sold, 15,880. Non-dividend shares sold, 47,100. Total New York, 62,980.

BOSTON MINING STOCK QUOTATIONS.

NAME OF COMPANY.	*March 30.	March 31.	April 2.	April 3.	April 4.	*April 5.	SALES.
Atlantic, Mich.	....	....	....	17.00	17.00	....	180
Bodie, Cal.	....	....	....	....	....	....	....
Bonanza D.	....	1.03	1.25	1.25	1.13	....	1,100
Boston & Mont., Mont	....	....	....	....	....	....	....
Breece, Colo.	....	....	....	....	37½	....	200
Calumet & Hecla, Mich	....	235	....	234	230	....	110
Catalpa, Colo.	....	....	....	....	....	....	....
Central, Mich.	....	....	....	....	....	....	....
Con. Cal & Va., Nev.	....	....	....	....	....	....	....
Dunkin, Colo.	....	1.27	....	1.30	1.22	1.30	1.25	1.25	....	....	....	2,450
Enterprise	....	....	....	....	....	....	....	....	....	....	....	....
Eureka, Nev.	....	....	....	....	....	....	....	....	....	....	....	....
Franklin, Mich.	....	13.25	13.00	13.13	13.00	12.75	....	13.00	12.75	....	....	649
Freeland, Colo.	....	....	....	....	....	....	....	....	....	....	....	....
Hale & Norcross	....	....	....	....	....	....	....	....	....	....	....	....
Honorine, Utah	....	....	....	....	....	....	....	....	....	....	....	....
Ironton Iron Co., Mich	....	....	....	....	....	....	....	....	....	....	....	....
Little Chief, Colo.	....	....	....	....	....	....	....	.25	....	....	....	300
Little Pittsburg, Colo.	....	....	....	....	....	....	....	33¼	....	....	....	400
Martin White, Nev.	....	....	....	....	....	....	....	....	....	....	....	....
Napa, Cal.	....	....	....	....	....	....	....	....	....	....	....	....
Osceola, Mich.	....	21 00	....	20.00	....	20.00	19.00	20.00	....	....	....	224
Pewabic, Mich.	....	2.75	....	....	....	....	....	....	....	....	....	100
Quincy, Mich.	....	69.00	....	....	....	68.00	67.00	69.50	68.00	....	....	35
Ridge, Mich.	....	....	....	....	....	....	....	....	....	....	....	....
Robinson, Colo.	....	....	....	....	....	....	....	....	....	....	....	....
Sierra Nev., Nev.	....	....	....	....	....	....	....	....	....	....	....	....
Silver King, Ariz.	....	....	....	....	....	....	....	....	....	....	....	....
Standard, Cal.	....	....	....	....	....	....	....	....	....	....	....	....
Tamarack, Mich.	....	....	....	....	....	....	....	....	....	....	....	....

NAME OF COMPANY.	*March 30.	March 31.	April 2.	April 3.	April 4.	*April 5.	SALES.
Allouez, Mich.	....	1.43	1.50	1.25	....	1.50	....	....	....	500
Arnold, Mich.	....	....	.40	....	.37½	....	....	....	....	400
Aztec, Mich.	....	....	....	....	....	....	....	....	....	....
Boston & Mont.	....	42.00	41 50	42.00	40.00	40 50	40.00	44.00	41.50	....	....	548
Brunswick, Cal.	....	....	....	....	.25	....	....	.25	....	....	....	500
Canada	....	....	....	....	....	....	....	....	....	....	....	....
Crescent, Colo.	....	....	....	....	....	....	....	....	....	....	....	....
Cusi, N. Mex.	....	....	....	.08	....	....	....	.08	....	....	....	600
El Cristo, U.S. Col	....	....	....	....	....	....	....	....	....	....	....	....
Hanover, Mich.	....	....	....	....	....	....	....	....	....	....	....	....
Honorine	....	1.10	....	....	....	....	....	....	....	....	....	100
Humboldt, Mich.	....	....	....	....	....	....	....	....	....	....	....	....
Hungarian, Mich.	....	....	.25	....	.20	....	....	....	....	....	....	200
Huron, Mich.	....	....	....	....	4 00	....	4.25	....	....	....	....	200
Kearsarge, Mich.	....	7.00	....	6.88	6.50	7.00	6 25	....	....	....	....	426
Kossuth, Nev.	....	....	....	....	....	....	....	....	....	....	....	....
Mesnard	....	....	....	....	....	....	....	....	....	....	....	....
National, Mich.	....	....	....	....	....	2.00	....	....	....	....	....	100
Native, Mich.	....	....	....	....	....	....	....	....	....	....	....	....
Oriental & M., Nev.	....	....	....	....	....	....	....	....	....	....	....	....
Pontiac, Mich	....	....	....	....	....	....	....	....	....	....	....	....
Rappahannock, Va	....	.18	....	.18	....	.18	....	.18	....	....	....	1,000
Royal, Mich.	....	....	....	....	....	....	....	....	....	....	....	....
Security, Colo	....	.40	....	....	....	....	....	....	....	....	....	500
South Side, Mich.	....	....	....	....	....	....	....	....	....	....	....	....
St. Louis, Mich.	....	....	....	....	....	....	....	....	....	....	....	....
St. Mary's	....	....	....	....	....	....	....	....	....	....	....	....
Sutro Tunnel, Nev.	....	....	....	....	....	....	.13	....	....	....	....	300
Washington, Mich.	....	....	....	....	....	....	....	....	....	....	....	....
Winthrop, Mich.	....	.30	....	....	....	....	....	....	....	....	....	100

* Past days. Boston: Dividend shares sold, 5,743. Non-dividend shares sold, 3,474. Total Boston, 11,222.

COAL STOCKS.

NAME OF COMPANY.	Par val. of sh'rs.	Mar. 31.		Apr. 2.		Apr. 3.		Apr. 4.		Apr. 5.		Apr. 6.		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Cameron Coal	100	....	....	15	....	20	....	22	....	....	....	....	....	300
Ches. & O. RR.	100	1½	¾	1½	¾	2¼	1¼	....	....	....	....	1½	....	3,692
Chic. & Ind. Coal RR.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Do. pref.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Col. & Hocking Coal	100	19	....	....	....	....	....	21	20	21¼	20¾	21½	21	2,010
Col., C. & I	100	32¼	31¼	31½	30¼	32	30½	33¾	32	33¼	32¼	34	33⅞	5,655
Consol. Coal	100	20	....	....	....	....	....	....	....	....	....	....	....	100
Del. & H. C.	100	104⅜	103½	104⅛	103⅜	105	103¾	105⅛	104½	106	105¼	107⅛	107	7,886
D., L. & W. RR.	50	125¾	125¼	125⅝	124½	125⅝	123½	125⅝	124	125⅜	123½	126¼	124¾	212,261
Hocking Valley	100	17	....	17	....	....	....	18½	....	....	....	19½	19	600
Hunt. & Broad Top	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Do. pref.	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Lehigh C. & N.	50	47¼	....	47¼	46⅞	47⅛	47⅛	47⅞	47¼	48	....	37⅛	37⅜	500
Lehigh Valley RR.	50	52½	52¼	52½	52¼	52⅝	52¼	52⅝	52¼	52½	52⅝	....	....	715
L. & W. C. & I. Co	....	....	....	....	....	14	....	....	....	....	....	....	....	928
Mahoning Coal RR.	100	....	....	....	....	....	....	....	....	....	....	....	....	100
Marshall Con. Coal	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Maryland Coal	100	8½	....	....	....	....	....	....	....	....	....	....	....	100
Montauk Coal	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Morris & Essex	50	....	....	....	....	....	....	....	....	....	....	....	....	....
New Central Coal	100	....	....	140½	....	138½	....	....	....	....	....	....	....	31
N. J. C. RR.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
N. Y. & S. Coal	50	75	73	74½	73½	77¼	74	78	77¼	77⅛	76½	79	78	21,845
N. Y., Susq. & Western	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Do. pref.	100	....	....	8	....	7⅞	7¾	8⅛	8	8	....	8¼	....	620
N. Y. & Perry C. & I.	100	27¼	....	26½	26	27	....	28¼	28	....	....	29¼	28¾	1,200
Norfolk & Western R.R.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Do. pref.	50	43	41½	42¾	42	45	43	17	16½	17	....	17½	17⅝	650
Penn. Coal	50	....	....	268	....	....	....	44½	44⅛	45½	44½	46¼	45⅝	20,520
Penn. RR.	50	54½	54¼	54⅛	53⅛	54⅜	54⅛	54½	54⅛	54⅛	54⅜	269	....	100
Ph. & R. RR.**	50	55⅜	53¼	53	51⅜	54⅛	53⅜	56½	54	54½	55	58¾	56⅛	4,481
Tennessee C. & I. Co.	100	26¾	....	24½	....	26	25½	27	26	27	26⅝	27¾	27	783,826
Westmoreland Coal	100	....	....	....	....	....	....	....	....	....	....	....	....	1,770
Whitebreast Fuel Co.	....	....	....	....	....	....	....	....	....	....	....	....	....	....

**Of the sales of this stock, 121,900 were in Philadelphia, and 661,857 in New York. Total sales, 1,000,600.

San Francisco Mining Stock Quotations.

COMPANY.	CLOSING QUOTATIONS. March 30.	March 31.	April 2.	April 3.	April 4.	April 5.
Alpha	....	....	....	....	....	....
Alta	2.50	2 45	2.45	2.25	2.30	2.35
Belcher	....	....	....	....	....	....
Belle Isle	.75	....	....	.75	.70	.70
Best & Bel.	6.25	6.25	6 00	5.50	5.75	5.87½
Bodie	2.70	2.60	2.55	2.50	2.50	2.60
Bulwer	.95	....	.90	.85	....	.95
Chollar	7.00	7.00	7.00	6.12½	6.50	6.50
C'm'weal'h	4.30	....	4.85	4.30	....	4.30
Con. C. & V	15.00	....	15.00	14.37½	15.00	14.87½
Con. Pac.	....	....	....	....	....	....
Crown Pt.	7.00	7.00	6.87½	6.62½	6.62½	6.75
Eureka C.	11.50	....	12.00	11.25	....	11.50
Gould & C.	4.65	4.75	4 60	4.30	4.45	4.45
Hale & N.	10.75	10.75	10.62½	10.00	10.12½	9.62½
M. White	....	....	....	....	....	....
Mexican	5.75	6.12½	6.00	5.50	5.50	5.62½
Mono	2 15	1.95	1.85	1 75	....	1.85
Mt. Diablo	4.25	....	4.25	....	4.25	4.25
Navajo	2.45	2.35	2.45	2.25	1 90	2.00
Nev. Queen	3.95	4.05	4.20	4 00	4 10	4.15
N. Belle I.	7.25	7 12½	7.25	7.00	6.87½	6.50
Ophir	10 50	10.87½	....	9 50	10.00	9.87½
Potosi	5.62½	5.75	5.50	5.12½	5 25	5.25
Savage	6.87½	6.62½	6.62½	6.00	6.25	6.12½
Scorpion	....	....	....	....	....	....
Sierra Nev	5.62½	5.62½	5.25	4.90	5.00	5.12½
Sutro Tun.	....	....	....	....	....	....
Tip Top	....	....	....	....	....	....
Union Con.	4.85	4.95	4.80	4.40	4.65	4.75
Utah	2.25	2.30	2.15	2.00	2.10	2.20
Yellow Jkt.	10.00	9.50	9.25	8.12½	8.62½	8.75

Thirds receive little attention; the quoted price on futures is $18.25 per ton.

Quicksilver is dull and unchanged at 68@65c.

Mr. T. F. Edmands & Co., of Boston, Mass., issued the following circular March 31st:

NITRATE OF SODA.	1888. Tons.	1887. Tons.	1886. Tons.
Exports from S. A. to Europe since Jan. 1	95,000	85,600	46,470
Exports from S. A. to U. S. since Jan. 1	25,000	19,951	16.175
Total exports	120,000	105,551	62,645
Loading in S. A for Europe, March 31	40.000	30,000	28,000
Loading in S. A. for U. S., March 31	5.000	10.000	3,000
Total loading	45,000	40,000	31 000
		Bags.	Bags.
Stocks at Atlantic Ports, March 31. 1888			55,000
Afloat and due in Atlantic Ports, April		124,000	
Afloat and due in Atlantic Ports, May		55 000	
Afloat and due in Atlantic Ports, June		95,000	
			274,000
Visible supply for U. S., April 1 to July 1, 1888			329.000
Visible supply for U. S , April 1 to July 1, 1887			240,000
Deliveries for consumption in U. S. for above time in '887			148,897
Deliveries for consumption in U. S. for above time in 1886			95,493
Deliveries for consumption in U. S. since Jan. 1, 1888			73.219
Deliveries for consumption in U. S. since Jan. 1, 1887			93,077
Deliveries for consumption in U. S. since Jan. 1, 1886			74,919

IRON MARKET REVIEW.

NEW YORK, Friday Evening, April 6.

The iron trade as a whole continues dull, with no change to note in prices. The Thomas Iron Co. issued a circular to their customers April 2d, stating:

"Our regular trade for years past have taken all the soft irons we made, and until 1887 we were able to deliver of 1X and 2X as required by our customers. Our furnaces for several weeks past have been making the usual amount of 1X and 2X, and should they continue to do as well in the future we will be able to deliver you the iron as heretofore. Our prices are $19 for 2X and $20 for 1X, f.o.b. at Perth Amboy, for cash in 30 days, or for your note at four months, with interest from date of invoice."

Their sales of foundry iron for 1888 delivery amount to about 30,000 tons, besides which they have sold about 50,000 tons of forge iron, most of which goes to the pipe foundries.

Southern irons continue to be sold at low prices, and there is no doubt that they are growing in favor as the foundries become accustomed to their use. There is rather more demand for foundry irons, but no indication of any stiffening of prices.

Scotch irons continue very quiet with very slight change in prices.

The steel rail market continues quiet, with sales of only a few small lots. There will be no great activity in steel rails in the West until the railroad strikes are adjusted.

The Board of Control has made an additional allotment of 200,000 tons, and some of the Eastern mills have already sold nearly all of their increased allotments.

The business in structural iron continues very large, and the makers of iron bridges and buildings are very busy.

Cast-iron pipes are also in large demand, and the foundries have plenty of work ahead.

Old Rails are very dull and weak, a sale of Tees being reported at less than $21.

Philadelphia. April 5.

[From our Special Correspondent.]

The necessities under which consumers of crude and finished iron are laboring have driven them into the market. The purchases made cover mainly actual requirements in hand. Some pig-iron makers have endeavored to sell the future output at the lowest prices at which business can be safely done. These offers have not met with response. The production of crude iron in Eastern and Middle Pennsylvania is not increasing. Agents have canvassed the market thoroughly and have not made large sales that are usual at this season. Prices remain about where they were, particularly for the little special iron that can be had. There are no actual changes in any kind of iron, although a few makers have shaded prices 25 cents per ton on condition that large lots will be contracted for. The agitations in progress concerning the tariff duties have much to do with the present dullness.

The pig-iron makers have not as yet received any response relative to the matter of freight rates, but the matter is under consideration. Those who have expressed themselves, take rather a gloomy view of the matter. Very little outside iron is coming into this market, and but little is under inquiry. The only encouraging point is that a good deal of manufactured iron is being ordered, and this will help the crude iron market, it is thought. Buyers of all kinds have declined to the lowest possible point, and a number of large buyers began last Monday to put in orders, and it is probable that the heavier consumers will make themselves safe this month for a quarter's consumption, as in no event will prices go lower, unless possibly freight rates should drop. There are probabilities of an improving demand right along for merchant bars, sheets, plate and tank. The basis of this statement is that consumers of such products are nearly out and have work in hand not yet covered.

Plate and tank are offered at very reasonable prices, in order to keep the mills going. Manufacturers throughout the State have confidence in the consumptive capacity being sufficient to keep the mills running fully 75 per cent of their capacity, but they know there is a general withholding of orders.

Nails are more active, though the improvement has not been reflected in prices. The additional steel rail allotment has been nearly taken up. An additional allotment may be made about May 1st. The matter is under advisement. Quotations rule as they have been for several weeks past. The decision of Mr. Carnegie to shut down his mill last night, because of the refusal of the workmen to accept his co-operative project, has caused some surprise in trade circles here, and it strengthens the opinion entertained heretofore as to the weakness of the steel rail trade. Old rails are declining in the absence of bids. Structural iron is moving along steadily at the usual figures.

Building requirements will be large. Claus Spreckles will build an immense sugar refinery and everything that can be bought here will be contracted for as soon as the preliminaries can be arranged. The Reading Company has not yet decided whether to make Arch or Market street its terminus. Quotations will be found in our weekly register of prices

Pittsburg. April 5.

[From our Special Correspondent.]

In the iron trade the general position of the market remains substantially the same as noted in our last report. Business of all kinds continues very much depressed, with but little prospect apparent of any immediate improvement. The consumption, so far as Pittsburg is concerned, is down lower now than it has been at any time this year, and owing to the very unsatisfactory condition of the market for the products, with no prospect of any immediate appreciation in the value of the raw article, consumers almost without an exception are buying as their immediate actual necessities require. In former years it was not unusual for certain mills to contract for two or three months stock, but at present there is no disposition whatever to anticipate future wants, and the indications are that the hand-to-mouth policy will be rigidly adhered to for some time to come.

There is still a wide difference of opinion among leading dealers in regard to the future of the iron market. Notwithstanding the fact the first of April is past, only very few limited orders have been placed, and those principally for small amounts. The outlook at the present can not be considered at all encouraging. There is generally a disposition to look at the bright side of things and to hope for the past, but an impartial review of the position does not furnish any very substantial basis for expecting more than a fair average volume of business, and that at a very low range of prices. A good deal of preliminary work has to be done in the way of adjustment of prices, and it will probably take all of 1888 (and possibly beyond that) to get down to the level required by the new conditions. The coke question is badly mixed. The price at $1 per ton will not continue it will possibly settle down to $1.25. A movement is on foot to have the war declared off.

The Edgar Thomson Steel-Works are still idle, and will so remain until the men come to Carnegie's terms. He says he will no longer pay three men for doing two men's work, the men must sign individually with the firm.

SALES SINCE OUR LAST REPORT.

Coke and Coal Smelted Lake Ore.	
500 Tons Gray Forge	15.50 cash.
500 Tons No. 1 Mill	16.00 4 mo.
500 Tons Gray Forge	15 25 cash.
500 Tons Gray Forge	16.00 cash.
500 Tons Bessemer	17.35 cash.
100 Tons No. 2 Foundry	17 00 cash.
50 Tons No. 1 Foundry, all Ore	17 25 cash.
50 Tons No. 2 Foundry, all Ore	16.75 cash.
50 Tons Gray Forge	16.00 4 mo.
50 Tons No. 2 Foundry	16.85 cash.
Coke, Native Ore.	
600 Tons Gray Forge	15.50 cash.
350 Tons Gray Forge	15.50 cash.
100 Tons No. 2 Foundry	16.75 cash.
100 Tons Gray Forge, Storage	15.00 cash.
50 Tons No. 2 Foundry	16 50 cash.
125 Tons No. 2 Foundry	17.00 cash.
Charcoal.	
55 Tons Cold Blast	25 50 cash
50 Tons Cold Blast	27.00 cash.
25 Tons No. 2 Foundry	23.50 cash.
Steel Rail Ends.	
1000 Tons Rail Ends	18.50 cash.
1000 Tons Rail Ends	18.50 cash.
100 Tons Rail Ends	18.25 cash.
Slabs and Billets.	
350 Tons Billets	28.90 cash.
300 Tons Slabs	28.50 cash.
500 Tons Billets	28.75 cash.
Muck Bar.	
1000 Tons Muck Iron	26.75 cash.
500 Tons Muck Iron	26 65 cash.
500 Tons Muck Iron	27.00 cash
Old Rails.	
300 Tons American Ts	22.25 cash.
300 Tons American Ts	22.50 cash
330 Tons American Ts	22.00 cash
Scrap Material.	
300 Tons No. 1 Railroad Scrap	Net 20.00 cash.
175 Tons Cast Scrap	Gross 17.25 cash.
150 Tons O. H. Steel	Gross 18.25 cash.
100 Tons Crucible S. Scrap	Gross 22.50 cash.
100 Tons Wrought Turnings	Gross 14.25 cash.

Louisville. April 4.

[Reported by HALL BROTHERS & Co.]

The market still exhibits some features of animation, and a good business is in progress. There is good request for all grades of coke, foundry and mill irons, and a much larger volume of business could be done at concessions in price, but the furnace companies claim that the present margin of profit is exceedingly small, and a general banking or blowing out seems preferable to further reductions. The recent stoppage of the Mahoning and Shenango Valley furnaces may have a tendency to check further decline. Out of ten furnaces in the Mahoning Valley seven have banked their furnaces. A majority of the stacks in the Shenango Valley are also idle. Stocks are comparatively light and are being reduced. There is a good call for charcoal foundry and car wheel irons.

Quotations for cash f.o.b. cars at Louisville will be found in our weekly register of prices.

FINANCIAL.

NEW YORK, Friday Evening, April 6.

There is nothing of interest to report in the mining stock market; transactions have been small and prices on the whole show but little change.

We are advised by the Little Pittsburg Consolidated Mining Company that "they have received a telegram stating that the suit with the Little Chief Mining Company had been decided adversely." Sufficient time has not elapsed to get full particulars by mail. The stock sold at 25c. Little Chief shows transactions at from 23 to 29c. Leadville a few at 38c. Dunkin at $1.30.

The fire at the mines of the Plymouth Consolidated Gold Mining Company has had a depressing effect on the price of the stock, which has declined from $9.75 @$8.50, but to-day advanced again to $9.10. Official advices state that the situation remains as reported by us several weeks ago.

Very little attention is shown the Bodie stocks. Bodie Consolidated shows but a few sales at from $2.50 to $2.60. Standard was not dealt in until Wednesday, when sales were made at from $3 to $3.25. Bulwer is neglected. Mono shows a quotation at from $1.95 to $1.75.

Brunswick continues to be firm at from 19@23c. The stock has been actively dealt in during the week.

The recent boom in the quicksilver stocks has "petered" out completely; but one sale of Quicksilver Peferred is reported at $33.

The upward tendency shown in Amador last week has continued, and the stock has advanced from $1.65 @$2.25, closing at $2.20 to-day. Middle Bar remains unchanged at from 52@54c.

Taylor Plumas shows a few transactions at 2c.

The price of El Cristo has ranged from $2.40 to $2.90, and the backers of this stock predict much higher prices. We have but little faith in these statements, for we are accustomed to this "booming" talk from that quarter.

Carupano remains unchanged at $2. It was daily dealt in at this price.

Homestake was neglected. No transactions are reported. Deadwood appeared at $1.85 but declined to $1.50. Caledonia shows one sale at $1.75. Iron Hill has gone down to 35c.

The manipulators of Cleveland tin are showing but little vigor. The price opened at $1.55 and advanced to $1.60.

Rappahannock was neglected and shows a few sales at 18@19c.

But little was doing in Horn-Silver, which was quoted at from $1 to $1.05. Ontario holds its own at from $27.50 to $28.50. Stormont shows a sale at 5c.

Consolidated California & Virginia has again come out with another dividend of $108,000. The large dividends paid by this company do not affect the price oft he stock much, which shows but a few sales at from $14.25@$15.50. The Comstocks on the whole were neglected.

A few transactions are reported in Union Consolidated at $5.30, in Utah at from $2.40 to $2.20, Scorpion at 97c., Potosi at $5.88, Julia from 75c. to 65c. Exchequer shows a decline from $2.40 to $1.95. Best & Belcher from $6.25 to $6.13. Alta, $2.55 to $2.40. Yellow Jacket from $9.88 to $9.13. Savage shows one sale at $6.65. Ophir a few at from $11.13 to $10.88. Belcher one at $7.13. Tuscarora stocks were quiet. North Belle Isle was dealt in at from $7@$7.25. Navajo from $1.85@$1.95. Belle Isle at 75c. Found Treasure at from $2@$2.10. Tornado at from 70@75c. Sutro Tunnel was quiet and attracted but little attention. The price was firm at from 11@13c.

Auction Sale of Stocks.

The following securities were sold at auction in this city on the 4th inst: 25 shares Pennsylvania Coal Company, 266; 300 shares Bosco Mining Company (without recourse); 1,000 shares South Bonanza Consolidated Mining and Smelting Company, of San Francisco (without recourse), $7; 1,000 shares Sutro Tunnel Company, 11c.; 1,000 shares New York & Honduras Rosario Mining Company, $4; 2,000 shares San Catarina Copper Company, $40; 75 shares Laflin & Rand Powder Company, 139.

Meetings.

The annual and special meetings of the following companies will be held on the dates given:

Marshall Consolidated Coal Mining Company, Denver Colo., April 7th, at twelve o'clock noon. Special meeting.

New River Mineral Company, No. 49 Cliff street, New York City, April 10th, at three o'clock P.M.

Pitkin County Mining Company, Aspen, Colo., April 10th, at eleven o'clock A.M.

Rockland Land and Mining Company, Rockland, Mich., June 4th, at one o'clock P.M.

St. Bernard Coal Company, Earlington, Ky., May 2d, at twelve o'clock noon.

Sloss Iron and Steel Company, Birmingham, Ala., May 2d, at twelve o'clock noon. Special meeting for the purpose of authorizing and confirming the issue of